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Malmesbury.

IN the course of his "Laboriouse Journey and Serche for Englandes Antiquitees," Mr. John Leland went from Cirencester to Malmesbury. He went all by "champayne grounde," through corn and grass, till he came to the stone bridge over Newnton Water, where the cattle love to cool their feet and drink deep draughts of the bright stream, and so up the narrow road between its high banks, and through the East Gate into the town. He was much impressed with its strong natural position, standing on the top of a great slaty rock and almost surrounded by water. "For Newton Water cummith a 2-miles from North to the town: and Avon water cummith by Weste of the town from Lukington Village a 4 miles of, and meate aboute a Bridge at South Est part of town, and so goith Avon by South awhile, and than turneth flat West toward Bristow." Some time before the two streams actually join they seem inclined to do so and approach each other within a "burbolt-shot," but then recede again to enclose the hill upon which Malmesbury is built. "Nature," says Leland, "hath dikid the town strongely." Man took advantage of the work begun by Nature, and already in very early times pitched upon this spot as a stronghold. Legend says that a certain British king, Dunwallo, surnamed Molmutius, first built a castle here, 642 years before Christ, which castle was called Caer Bladon. But this tremendous antiquity cannot be authenticated. The place, however, seems to have been known by its British name of Caer Bladon, and charters announce themselves as "dated publicly on the river Badon." Presently the name became Ingelburne, and remained so for a long time, till a certain Scottish (or, as some say, Irish) monk, Maildulph, being too closely beset with thieves and robbers in his own land, set out, as many of his compatriots have since, to seek his fortunes in England. He wandered about the country, "thinking where God would dispose of him," and at length was attracted by the pleasantness of the wood under the hill on which the ancient castle of Ingelburne stood. He asked and received permission to establish himself in it as a hermit. Presently, "being here destitute of necessaries, he chose to himself scholars to instruct, to improve the meanness of his subsistence by their liberality." The school grew famous, and with it its founder, Maildulph: so much so that the town of Ingelburne gradually ceased to be so called, and was known as Maildulfesburg, or the city of Maildulph, and this, philologists tell us, became contracted into Malmesbury.

Among Maildulph's scholars the most noted was Aldhelm, one of the great men of his age. He founded the monastery at Malmesbury, as well as one at Bradford on the same Avon that flows half round Malmesbury. Of this latter monastery there still remains the Saxon church, one of the few authentic examples of that ungainly style. St. Aldhelm's fame was not posthumous merely. His epistles to the students at Cologne, Paris, and other distant places established his reputation as a holy man, though they have long disappeared. He was, too, the first Englishman who wrote in Latin and taught his countrymen to write Latin verses. Here we may behold dimly, through the mist of centuries, by the side of Newnton Water, the *fons et origo* of many a schoolboy's misery. After a long and laborious life the pious Aldhelm died, Bishop of Sherborne in Dorset, in the year 709, and with him was quenched one of the few bright lights that helped to illumine the Dark Ages. His memory was long preserved by a great fair, held on the Feast of St. Aldhelm, which brought together such great crowds that it was one of "the bragges of the toun," says Leland, "that the toune kepith a band of harnesid men to se peace kept."

The monastery was by this time fully established and in possession of a church, in one of the chapels of which, or in a small adjoining church, according to Leland, occurred one of the most remarkable events in scholastic history. One John Scot, who taught Greek to the youth of Malmesbury, was actually A.D. 883 slain by his scholars with their pen-knives or "table pointelles,"—surely the most tragic fate that ever overtook a pedagogue. There is still a school taught in part of the ancient abbey, but it is marked neither by the lofty learning nor the startling episodes of John Scot's time. Over the south porch, and approached by the old corkscrew staircase, is a parvise in which a score or two of little children imbibe the rudiments of knowledge, and rise with true rustic awe when the sound of their shrill voices floating through the narrow window leads the wondering stranger into their midst.

In course of time, the possessions of the monastery or abbey grew enormously, one of its most notable benefactors being King Athelstan, who, in addition to valuable mundane gifts, bestowed on it "several presents far exceeding all human treasure," namely, a piece of the true Cross and of the Crown of Thorns. So much did the monks revere this monarch's memory, that a feast was established in his honour, which is observed to this day. His tomb is also pointed out in the abbey,—the only one that has survived the ruin of the Dissolution; but the merest tyro can tell at a glance that the tomb is centuries later than the king it commemorates.

All these celebrities had passed away long before any part of the existing building had been begun. It is generally supposed that Roger, Bishop of Sarum, caused the church to be built,—the same Roger who beautified the old cathedral, long demolished, which stood in the fortress of Old Sarum. Malmesbury Abbey was, in its prime, a large and magnificent place; one of those which, perhaps, from their very vagueness, best convey an impression of the enormous wealth and splendour of the Church before the Dissolution. When we recollect the number and beauty of the cathedrals and abbeys still remaining, and remember that quite as many, and those of equal pretensions, were destroyed at the dissolution of the monasteries, we begin to realise what the country must have looked like at the beginning of the sixteenth century. Malmesbury Abbey Church was cruciform on plan, with a great tower at the crossing. Only part of the nave is left now, six bays out of the nine being roofed, and used as a parish church. They are in the solemn and majestic style of the earlier half of the twelfth century. The grim and relentless lines of true Norman work had softened a little. There is still the rugged strength and the massive construction, but graced by something of the suppleness of Early English. It is all allied to the majesty of barbarism, and the savage tooth still grins out from some of the arches. The splendour and the barbarism culminate in the south porch,—one of the finest things of its kind in all England. The doorway is rather over 7 ft. wide, recessed in an arch of eight bold orders, spreading on either side to a distance nearly as great as the width of the door itself. Three of the orders are carved with historical subjects, the rest with the formal interlacing patterns characteristic of the period. The historical subjects embrace the customary events from the Bible, treated with the customary realism and the usual stiffness of pose and drapery. There is no ingenuity of light and shade, none but the most elementary rhythm, but it is magnificent, with the magnificence of the time when kings lived in splendid squalor, and the mightiest barons could neither write their own names nor read any one else's.

Leland was struck with the aspect of the church, "a right magnificent thing," with a steeple,—a "mighty high *pyramis*,"—that stood at the crossing, and was a mark to all

he country about. It had fallen, as we gather, within memory, at the time he wrote. Already then, in 1540, the king's commissioners had condemned the church to ruin. The abbot's lodgings were occupied by the looms of one Stumpe, a wealthy clothier; nay, his weavers were at work in the very chapel where John Scot was stabbed to death by his pupils, but the six bays of the nave that were still entire he had secured and caused to be made into the parish church. He had bought the abbey church and its precincts as well as Charlton and other of the monastery's lands from the king, who soon afterwards, being in the neighbourhood hunting, paid Mr. Stumpe a visit. That gentleman, hardly accustomed to such honours, was caught by the monarch and his hungry retinue with an empty larder. But he was equal to the occasion, and ordered his many weavers to fast for the rest of the day, and send in their dinners to him. With this homely fare, of which the quantity was more commendable than the quality, he gave his royal highness a satisfying meal, and the whole party left much pleased with their entertainment. Mr. Stumpe, the wealthy clothier, affords an example, of which there are many others, of the alliances formed in old times between families devoted to trade and those boasting a lofty descent. His son, who married a daughter of Sir Edward Baynton, became the progenitor of many of the earls of Suffolk and Berkshire, the family which still retains Charlton and its beautiful mansion, built some sixty or seventy years after Stumpe first bought the property. If noble families did not then actually engage in trade themselves, they very frequently allied themselves to those who did, and we must look to later years for evidence of the scorn supposed to be felt by "blood" for trade.

Stumpe deserves to be gratefully remembered, if only for preserving so much of the abbey church. The six bays that are left are enough to show how fine a building it must have been. In addition to the great central "pyramis" of a steeple, Leland mentions a square tower at the west end, but it may reasonably be doubted whether, from its great height, he did not mistake the square ruined corner of the church itself for this tower. It seems difficult to reconcile his statement with the actual state of the ruins at the west end. There are remains of a great Perpendicular west window, over a west door of the same character as that to the south porch, but not so fine, and many of the existing windows are of the Decorated era, as well as the vaulting over the nave, which shows that great works must have been undertaken in the fourteenth and fifteenth centuries; but the principal claim of Malmesbury Abbey to the high place it holds lies in its Norman nave. The church seems to have fallen to ruin very rapidly after being condemned by Henry VIII.'s commissioners. Leland describes it as ruinous, though many of the domestic buildings still existed then, and were occupied by Mr. Stumpe's looms. A very bad drawing in Dugdale's "Monasticon," of 1682, shows hardly anything more than we see now; but since its palmiest days the foundation has sadly dwindled. In the churchyard once stood a castle, built by Roger of Sarum; but this was soon pulled down, to allow the monastery to extend. Leland says there were three churches in the churchyard,—the abbey church, the old parish church (St. Paul), and the little church in which John Scot was slain. The latter has quite disappeared, while of the old parish church only the tower and spire remain, the body having been taken down before Leland's visit. The tower is now the campanile to the remnant of the abbey church, so that it is observed that the parish church is in one parish and its bells are in another. They are not, however, the old bells of the abbey, of which there are said to have been ten in the central tower and two in the western, if it ever existed. One of the ten was called St. Aldhelm's bell, and was rung during thunderstorms, in order to scare away the evil spirits who brought the lightning and thunder. Alas! for those picturesque old times. How much more hold must storms have had on men's imaginations when they believed them to be the work of devils actually at that moment careering through the sky, scared, it was to be hoped, by the sonorous tones of the St. Aldhelm's bell, which boomed out through the lulls of the tempest.

Truly, of all the glories of the great abbey, not many are left to-day. The six bays of the nave roofed in and preserved; the south porch, with its wonderful doorway; remains of the three ruined bays at the west end; one of the arches of the central tower; and a fragment of the south transept. All the choir, all the north transept, all the cloisters, all the abbot's dwelling and domestic offices, are gone, save what may have been worked into the house standing a little way from the east end, built in Elizabeth's times, out of the old materials, and covering cellars of the early work of the abbey. The two subsidiary churches are gone, as also are several chapels and hospitals in various parts of the little town, which once made Malmesbury rich in architectural interest. Its walls, too, are gone, and its gates; but at the south-east end of the town are the Corporation Almshouses, which form part of the ancient hospital of St. John of Jerusalem. It was here that Stumpe entertained Henry VIII. with his weavers' victuals. A doorway walled up serves to attract the notice of the seeker after antiquity, but there is little else to see.

One feature there is in Malmesbury that deserves investigation as well as the abbey, and that is the market cross, "made al of stone and curiusly voultid for poore market folkes to stande dry when rayne cummith." It is octagonal on plan, with a great pier at each angle, and from pier to pier an arch. The vaulting is carried by a central column, which is taken up above the roof to receive a flying buttress from every pier. Eight canopied niches surmount the junction of the flying buttresses, and above them the structure terminates in a crocketed cupola, the whole forming one of the best and most perfect specimens of a market cross still extant.

Some two miles away from the town is Charlton House, an interesting specimen of Jacobean architecture, built by the wife of the Earl of Suffolk who caused the mighty mansion of Audley End to be erected. But apart from the special attractions of this house, Malmesbury offers, on its own account, much to interest the traveller. Its ruined abbey, its market cross, and the tower of St. Paul's, exhaust the list of its notable features, but the whole appearance of the place is quaint, built as it is on a hill sloping away on every side, and on some sides so steeply as to give, without the need of any architectural effort, a vigour and piquancy to its cottages seldom met with among the easy undulations of England.

MR. EMERSON'S DESIGN FOR THE LIVERPOOL CATHEDRAL.

WE give this week views of the interior of Mr. Emerson's design for the proposed Cathedral at Liverpool, and of the exterior from the south-west, showing the design of the western façade. The south-east view is given in our publication of the 9th of this month. To these are added the longitudinal section, the south elevation, and the plan. We have some further illustrations to give in a future number; but the selection here made, combined with the view we published on the 9th, is sufficient to convey a full idea of the main aspect, arrangement, and character of the design.

As will be seen, the design differs much in style and composition from the usual ideal of an English church or cathedral. The able report which accompanies it deals at considerable length with the reasons for the special features in plan and design. The report deserves special mention before we proceed to consider the design itself, for it goes into the whole question of the relations of a modern cathedral design to its site and surroundings and its objects, commencing from the question of the general impression to be produced by the cathedral as a portion of the *coup-d'œil* of the city in which it is erected. Mr. Emerson's remarks on this subject, and also on some points connected with the internal treatment, and the relative effects and proportions of parts resulting from different arrangements of plan, are very suitably and pointedly illustrated by small views reproduced from photographs of Florence, Rome, London, Rouen, &c., with their cathedrals forming central objects in the view, and similarly produced views of the interiors of some existing cathedrals. The whole report shows that the author has gone into the project from almost every point of view, and given the most careful and thoughtful consideration to it.

We proceed to sum up or reprint from this report such passages as are most necessary in order to fully explain the author's own views, our object being to give each competitor's statement of his own case in his own words before offering any independent comments on the design and on the views embodied in the report. Some portions of the report, however, it will be sufficient to give the substance of in a *résumé*, without quoting the text in full, as architectural readers will sufficiently understand what is aimed at without all the detail of explanation which it is desirable to lay before a mixed committee.

In regard to the style to be adopted, Mr. Emerson expresses the opinion which we have already expressed, that the long Mediæval type of church cannot be adequately carried out for a first-class cathedral within the limits of the site selected; but he adds to this the argument, that in a large city the mediæval type of church does not present sufficient mass to hold its own in the general view of the town. He illustrates this from distant views of London and Paris:—"Westminster and Notre Dame stand out with no especial prominence, while St. Paul's and the Pantheon impress the eye at once. In Edinburgh the new cathedral, even where one can command a full view of it, looks unimportant, not to say unimposing, and from the city it is scarcely seen at all." It should be remembered, however, that this last, though bearing the title of cathedral, is not on the usual cathedral scale; it is only a large parish church.

"To secure the effect of mass, a treatment differing from the long and narrow Mediæval one is necessary, and imperatively called for in the case of the Liverpool Cathedral.

I consider the pyramidal form of grouping, with the grand domical central feature, to be the best:—

1st. Because its mass, in combination with its height, gives the greatest attainable grandeur and impressiveness.

2nd. Because it best ensures the execution of a plan essentially adapted to the modern requirements of the cathedral service.

Liverpool itself, indeed, may be said to have no distinctive cathedral associations; but the people are English, and have memories which connect themselves with the beautiful Mediæval churches of the country. Accordingly, while, to suit the city and the requirements of our modern service, a new departure is desirable, and should be made, the architecture, out of respect to the sentiment of the people, should follow the principles and express the feeling of our grand old Gothic cathedrals.

To effect this combination, and design a cathedral which shall be worthy of the second city in the British Empire, has been my aim in the plan I have submitted.

Style of Architecture.—Some might think that the surroundings demand a Classical or Renaissance treatment. To my mind a style of building based on this idea would be a great mistake artistically. The scale of St. George's Hall is enormous; and a cathedral of similar architecture, holding its own in respect of detail, would require to rival St. Peter's at Rome in magnitude; and this would only overwhelm the Hall, a building which the cathedral should enhance and not extinguish. A further and cogent reason why a Classical architecture should not be adopted is, that it is pagan and un-English in its origin, while Gothic is Christian, and, moreover, our national style of architecture; and, whatever may be done in the matter of our civil or municipal buildings, surely our religious edifices ought to preserve the Christian character that they have borne for ages. The style to be adopted should be in harmonious contrast with the surroundings, and edifying, not annihilating. It should be broad, simple, and dignified. Such a style is to be found in a very early phase of the Gothic, when it had just shaken itself free from the trammels of Classic art. The east end of Canterbury Cathedral may be referred to as a notable example out of many. This, accordingly, is the style which I have adopted. It will be found at once good for a simple broad exterior, suited to the atmosphere of Liverpool, and

capable of a rich interior in keeping with its magnitude; and that it may be made to vie with the best work of the Greek artist is shown by the detail, at Arles, Loches, Poictiers, Fontifroide, Perigueux, Angoulême, Toulouse, &c., where we have the nearest approach to the Classic feeling found in Gothic work, and which is exceedingly beautiful. The *contrast* of the early Pointed arches and the detail with the surroundings, would be the most harmonious and the best, and by reason of the difference in character would do away with any sense of competition with the adjacent buildings, such as another Classical erection alongside of them could not fail to suggest.

Plan.—As the mystery affected by the religious bodies in the Middle Ages, and which enforced their separation from the congregation and partial concealment by choir-screens, &c., no longer exists, and modern feeling demands that the largest number shall be admitted to see and hear the services that are specially intended for their benefit, without being impeded by large piers, it is necessary that the construction be such as to ensure an extensive unbroken area in the interior. Respect, on the part of the architect, for this demand is not only in accordance with all that has been written and said during the last few years on the necessity for churches being suited to modern requirements, but also with the fact that on the Continent within the last two centuries over 1,000 churches have, for this reason, been erected on this principle and surmounted by domes. I have, therefore, added to the nave and transepts, of the great width of 53 ft. from centre to centre of the arcade walls, an open space in front of the choir and pulpit of about 9,000 superficial feet, exclusive of the accommodation in three galleries, containing 1,200 superficial feet. This is after the plan at Ely. Some might think that a wider nave of, say, 70 ft. span, would be better than this open central area. It would certainly not, for three reasons:—1st. By the plan submitted, nearly 1,400 persons can be accommodated in the unbroken area within 100 ft. in front of the pulpit, exclusive of the gallery accommodation; whereas in a nave of the Basilica type of, say, 70 ft. wide, only 1,000 could be accommodated within 100 ft. of the pulpit; and, in a nave of 50 ft. wide of the same type, only about 710 could be accommodated within the same range,—a calculation which, of itself, clearly shows the enormous advantage of the open area. 2nd. The best proportion for height and stateliness is that the height should be about twice the width; more gives a contracted effect, while less is unimposing. Thus, a nave of 70 ft. span would require to be 140 ft. high, which is too much; whereas, if of only the ordinary height of, say, 90 ft. or 100 ft., it would be oppressive. 3rd. If so great a height and width as 70 ft. and 140 ft. were maintained, the constructional difficulties would be disproportionately increased. The abutments necessary to resist the thrust of such high and enormous vaults would be too cumbersome and costly. The remarks just made in reference to proportion of height and constructional difficulty apply with as much force to this open space as to the nave. A Gothic vault over such an area of, say, about 100 ft. diameter, and of proportionate height, would require abutments out of all proportion, and be excessively expensive. If, in order to take advantage of the external walls for abutment, it were vaulted at about the same height as nave and transepts, the effect would be crushing and oppressive in effect on account of its lowness, and besides be very bad for acoustics. A Gothic dome, on the other hand, properly constructed, is self-supporting, and has no thrust, and but little tensile strain. It can, moreover,—an important point in regard to economy,—be erected without centering, which a vault cannot. Again, were such an area roofed by a ribbed vault, its chief internal charm, viz., the impression of vastness, would disappear, as the divisions would render it easily measurable to the eye, and therefore unimposing. This is apparent at Ely. A dome is impressive internally in proportion to the inability of the eye to measure it, as, *e.g.*, in the Pantheon, in St. Peter's, in Sta. Maria del Fiori, in St. Sophia, and in the Gol Gomuz. This property gives it vastness; and grandeur is unattainable without a sense of vastness. For decorative purposes, also, the unbroken surface of a dome is more susceptible of a majestic treatment than the cells of a ribbed vault. A dome, therefore, internally, is the best artistically. If a precedent be required for the introduction of a dome to Gothic architecture, the magnificent examples of Sta. Maria del Fiori and the Baptisteries at Pisa and Florence may suffice, without mentioning inferior instances in Italy, Germany, France, and Spain. Moreover, the beautiful Mohammedan domes so common in the East are practically Gothic. They are so in principle and feeling, and are supported on Pointed arches.

DETAILS OF THE ARRANGEMENT OF THE PLAN, AND THEIR REASONS.

Four points in the plan call for especial remark:—

1st. The reasons for the octagon, and the relation of the dome to the nave.

2nd. The triapsal arrangement at the east end.

3rd. The western porch and the position of the western towers.

4th. The apsidal ends to transepts.

1. *The Reasons for the Octagon, and the Relation of the Dome to the Nave.*—One charm of Gothic cathedrals is found to lie in the aisles; the vista in many of them is delightful. In a cathedral church, moreover, meant to accommodate thousands, aisles are a necessity. They are necessary, not only for congregational purposes, but to give ample passage-room without disturbing the congregation during the service, as well as to yield artistic effect, and to supply space for tombs and monuments. In a domical church, however, when the dome is over a square space and on four legs, aisles become impossible without great expense and waste of room. The piers necessarily become so large that they block the aisles. The waste of room that results when aisles are added outside the piers is shown notably in the Pantheon at Paris, where two rows of columns occupy the useless space behind the large piers; although this blocking of the aisles with the waste of room is less important in a Roman Catholic church, the recesses behind the large piers being utilisable as chapels, or as at the Oratory, Brompton. St. Paul's, London, notwithstanding its stately dignity and beauty, is somewhat marred by two causes:—1st, The nave is too narrow in proportion to the dome; and, 2nd, the circular arches to the pendentives under the dome spring uncomfortably and unconstructionally. This is because, circular arches being necessitated by Italian architecture, a *regular* octagon under the dome was unavoidable; and this reduced the width of the nave. By a Gothic treatment these faults are avoided. In the plan submitted, by reason of the *irregular* octagon, a wider nave than St. Paul's is obtained, and one in proper proportion to the dome, which is less than St. Paul's; while all the arches of the octagon under the dome spring properly. The octagon is 103 ft. across diagonally. Though a large open area and grand central feature, at the crossing somewhat encroaches on the length of the actual nave, the vista from west to east remains the same, and has the advantage of increasing the general picturesqueness. Externally, for a pyramidal group (in favour of which I have before given my reasons), the shorter nave is advantageous; and under any circumstances the one bay extra length shown on Plan B, No. 6, is all that is desirable to lengthen a church of this plan, either for congregational purposes or for artistic effect. The system of cross-pendentive arches under the dome has, apart from its picturesque and varied lines, several other great advantages:—1st. It has acoustic advantages. 2nd. The dome and its pendentives are brought well into scale with the nave. To effect this has always been a difficulty in domed churches. It is generally overcome, as at St. Peter's, by making the nave enormous in width, height, and detail. But this is fatal to impressiveness as having a dwarfing effect on the church, the eye being thereby deceived as to the size. This is notorious at St. Peter's. In St. Sophia, scale is obtained by the juxtaposition and contrast of the the smaller arches. This is one reason why galleries are introduced in the alternate sides of the octagon. They have three small arches each, and can be utilised to accommodate the organ and extra musicians, or for seats on extraordinary occasions. These galleries are not necessary constructionally, and, if thought desirable, only those on each side of the choir for accommodation of the organ need be retained. 3rd. By the pendentive system adopted, the principle of construction of hanging the weight inside renders a less cumbrous external abutment necessary. 4th. The angle of the sloping face of the vault is most advantageous for decorative purposes, by bringing the subjects without distortion within an easy angle of vision. Internally the subdivisions of the octagon and cupola become smaller as they ascend, till in the cupola they cease altogether, and the cupola offers simply a grand surface for decoration. This prevents the eye from easily measuring it, and gives a sense of vastness. The nave shown is 53 ft. from centre to centre of arcade, and 97 ft. high. This is somewhat wider than that of any of our English cathedrals. The width of the nave and the space at crossing makes the plan at first glance look short; and, were the octagon regular and the nave only 40 ft. wide, the church would, on paper, look rather longer; but for the acoustics, convenience of seeing, and general effect of spaciousness, there could be no comparison. A narrow nave, moreover, is unsuited to modern services. Referring to the mourning service in Westminster Abbey to General Gordon, the *Pall Mall* said:—"The Dean gave a suitable address, but the greater number of those present could not join in the services."

The Triforium.—This is so arranged that a passage-way is provided all round the church, and that to the nave and choir is an actual gallery, which might be of use on special occasions, access being obtained from the staircases in the large piers to the dome. It is also well lighted, and gives access to a shallow gallery over the west entrance. It is carried round the recesses above the galleries at the alternate sides of the octagon.

II. *Reasons for the Triapsal Arrangement at the East End.*—An apsidal east end is necessitated by the proximity of St. George's Hall. *Internally*, with the usual form of apsidal-ended choirs, the bays and arcade arches become attenuated; they look small, unimportant, and wanting in dignity, compared with those of the nave. This is most apparent when they are viewed from the extreme west end of the church. The perspective diminished them still more. Witness the effect in Westminster Abbey, Notre Dame, Amiens, Cologne, Chartres, and Bayeux. *Externally*, a forest of flying buttresses and pinnacles is entailed by the plan of the vaulting consequent on the narrowness of the arcade arches. The result is a want of repose and breadth; but the triapsal arrangement adopted avoids these faults. *Internally*, three stately main arches or bays are obtained in scale with those of the nave, and the smaller arches become subsidiary. They do not clash with the main arcade, and they give scale to the larger parts. *Externally*, only four large flying buttresses and turrets are needed, as all the weight is brought to only four points of support. One advantage of this arrangement, on this particular site, also is, that it enables the ambulatory to be lessened in width with perfect harmony. This gives the greatest possible internal length from the west wall to the altar. Another point is that greater variety of effect is obtained than in the somewhat monotonous ordinary apsidal plan. Externally also the circular lines harmonise well with the round ends of St. George's Hall and the Picton Reading-room. This will be obvious from the perspective view.

III. *Reasons for the West Porch and the Position of the Western Towers.*—It has been said that the entrances to most Gothic cathedrals resemble holes into beehives. This is true of the English cathedrals, excepting Peterborough and Lincoln. This feature cannot fail to strike those who are acquainted with the magnificent lofty entrances to Oriental buildings. I have adopted the idea of the Peterborough porch:—1st. For the sake of grandeur. 2nd. Because the more elaborate doorways are thus protected from the weather. 3rd. Because, as the site slopes from east to west, there must be flights of steps either at the corners, as on Plan A, No. 5, or on the west front, as on Plan B, No. 6 [the plan published in this number]. In either case a porch or narthex is necessary. For, in the first arrangement, a passage of some sort is needed to obtain entrances into the centres of the nave and aisles at the west of the church, and, in the other, the steps landing close to the doorways without a porch would have a very poor effect. By the arrangement shown on Plan B, carriages could drive through on state occasions to the west door. The reason of placing the towers outside instead of at the ends of the aisles is threefold:—1st. To avoid the painfully-contracted effect produced by two tall towers immediately flanking the nave, as in the case of the cathedrals at Cologne, Chartres, Rouen, Brussels, Lichfield, York, the abbey at Westminster, and numbers of others. 2nd. To obtain a grand spreading west elevation with the dome well visible in the rear. 3rd. Because in the view from either side of St. George's Hall, as in Perspective A, No. 19, the whole length of the nave is seen, whereas one bay would be hidden by the towers if they immediately adjoined the nave. The greatest effect of length is thus obtained. The cathedral of Cologne is a notorious example of how a long church can be spoiled both on the west façade and side views by the towers immediately flanking the nave.

IV. *Reason for the Apsidal Ends to Transepts.*—This arrangement has been adopted for acoustical reasons, and also to obtain the full effect of the length of the nave externally. Square transepts would hide more of the nave in the side views. Abnormally wide transepts arranged to supply an accommodation equivalent to that of a large central area would be disastrous on this site to the external effect in shortening the length of the church. A further reason for the apsidal ends to transepts is that the roof-vaulting works in so much more happily than it does with square ends.

The Choir and Sacrarium.—The general arrangement of the choir and sacrarium speaks for itself. The altar is placed a little in advance of the arch over the centre apse. It is 6 ft. 6 in. above the floor of the nave, and more steps might easily be added at the entrance to the choir, if thought desirable. Gates on either side near the altar rails provide exit for the communicants. The Bishop's throne is situated on the south side, in the centre of the bay. The choir accommodates eighty men and boys, including clergy stalls. A simple choir, with only a few figures round the sacrarium, and an iron screen, is shown in Section A, Nos. 17 and 12. An alternative arrangement, enriched with a sculptured screen separating the ambulatory from the sacrarium, and with canopied figures on the large piers, is shown in Drawings B, No. 17a, and B, No. 18, and by the perspective view of the interior. [The section which we publish shows this more enriched design.] This richness in a church of such magnitude seems necessary as a focus, and gives scale to the interior views.

Morning Chapel.—This is provided on the north side of the choir, and will seat about 130 persons. It has a side door for early services.

The Organs.—Fine organs are often spoiled for want of proper accommodation being at first arranged on the plan. Space for the large organ is provided in the gallery on the north side of the choir; or it might be divided and occupy the galleries on either side. The organist and claviers would be placed between the large piers on the north side, immediately behind the choir-men. The modern appliances in relation to organ-building

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render connexion between the keys and sound-producing portions of the organ a matter of the greatest ease, and that without the introduction of any very visible construction or casing extending from one to the other. The position of the organ here, with the circular form of recessed gallery behind it, and the great height and curved vault above it, would most advantageously throw the sound well out into the body of the church. A choir-organ would be placed opposite the Bishop's throne in the choir, also connected with the general claviers by pneumatic or electric action. This arrangement, by which both organs could be played from one console, would render the effect which is so highly appreciated in many large Continental churches, possible for the first time in this country, namely, the possibility of accompanying the choir with the soft choir-organ, and the responses by the congregation on the grand organ under the dome.

The Font.—This is placed on the south side of the nave, between the first two piers of the arcade. A baptistery has not been provided, as it seems hardly needed in an English cathedral; moreover, modern feeling seems to demand that the rite should be celebrated in view of the whole congregation. Nevertheless, were a baptistery desired, it could easily be arranged, as shown by the dotted lines on the plan, where it would occupy the width of one bay of the nave, and a depth equal to the width of the tower.

The Pulpit.—This is placed under the dome, adjacent to the large pier on the north side of choir-steps.

Lighting.—The windows are all wide and high, and the lower windows are kept free from tracery. Means are provided for walking all round the building at the level of the sills of the aisle and clear-story windows, so that repairs, &c., may be effected without trouble or expensive scaffolding. Gas or electric light might be used for artificial lighting, and might, for the most part, be effected by an arrangement of hanging lamps.

The Vestries.—The Bishop's, Dean's, Canon's, and Choir-men's vestries are situated on the south side of the ambulatory. The choir-boys' vestry is below at the crypt level. It is well lighted, and also forms the choir-school. It is approached by two staircases; one near the priest's entrance from the cloister; the other from the aisle on the east side of south transept. The boys would join the men in their vestry by means of these stairs before entering the church. Ample space for presses to accommodate the vestments is supplied, and safes for church plate. Lavatories are provided for the clergy and the choir; for the former at the upper level; for the latter at the crypt level. Above the Dean's and Canon's vestries a large room is supplied, which might form a library or a supplementary vestry, and might also afford extra space for vestments, &c. It is connected with the chapter-house, to which it might form an ante-room. It helps the scale of the church, and masks the west side of St. George's Hall; but its omission would not affect the general aspect of the design.

The Chapter-house.—This is provided over the Bishop's and choir-men's vestries, and is approached by a grand staircase from the east side of the south transept aisle. It is also, as before stated, in connexion with the room available for a library over the Dean's vestry, and may be approached from the priest's staircase. This is a convenient position and arrangement for both private and public or processional meetings.

The Crypts.—The crypt proper follows the general plan of the church. It is lighted by windows on all sides. There are also windows under the east dwarf walls between the sacrarium and ambulatory below the choir-floor level, and circular lights are obtained in the floor of the church. These would be Hyatt's lens lights, masked by ornamental bronze or iron grilles flush with the surface of floor. A large opening under the centre of dome, also filled with a movable grille and glass, would allow for the lowering of biers. An entrance is obtained under the west porch by an unobtrusive door.

The Consistory Court, the Diocesan Offices, and the Muniment Room.—These are placed on the south side of crypt, near each other, though with separate entrances, and also with access from the church. All have good direct light. The open space by the consistory court would answer as a waiting-room at elections of proctors or other meetings. On the north side under the transept the heating apparatus is placed. The heating would be by high pressure and small pipes, in channels formed in the thickness of vaults over crypts. Also space is provided for a bellows-room for organ. The bellows would be worked by either gas or hydraulic engines.

Sub-Crypt.—A sub-crypt is supplied under the nave only:—1st. To place in it the human remains found in the churchyard, which might be perfectly sealed up in brickwork set in cement. 2nd. Because, at the west end, part of it would be above ground, so that very little excavation is needed, and the stone obtained would possibly be used.

Seating.—This church will seat 3,000 persons, exclusive of the aisles, and the seating would presumably be chairs. The aisles would accommodate about 430 extra.

CONSTRUCTION.

The Walls.—The church would be faced with stone externally and internally. The walls would be hearted with cement concrete, the facings being bonded together by frequent through stones and courses of solid masonry.

The Roofs.—Nearly all the churches that have been destroyed by fire have been so in consequence of their having timber roofs. I therefore propose fireproof roofs; and, indeed, no timber is used from foundation to finial. The outer covering would be formed of a plain concrete barrel vault, strengthened with brick arches over each pier. In the lower parts of the vaults the concrete would be composed of an aggregate of considerable weight. Approaching the apex it would be of much lighter specific gravity. The thick portions would be lightened by voids formed by the introduction of light earthenware pipes. These vaults would, in the lighter parts, be of no great thickness, and would obtain extra tenacity and fibre by embedding a network of copper wire in the concrete. I have before constructed church vaults in this manner; and in one of the largest modern public buildings in India I arranged the roofs entirely with vaults to the exclusion of timber. These barrel vaults might be covered externally with either lead or copper, or thin terra-cotta tiles fitting into grooves formed in the upper face of the vaults. Concrete being slightly porous, a covering would be needed. In other respects this is a simple adaptation of the Roman method of forming stone roofs. The lower vaults, viz., those seen from the interior, are of ordinary construction, and might be filled in with either bricks, stone, or chalk. If these were likely to be decorated with mosaics, bricks would be best. It is easier to fix mosaics more securely to brickwork than to the others. If it should be decided that mosaics are not to be used, then either stone or chalk would answer the purpose. The crypts would be vaulted with bricks and concrete. The double vault is necessitated partly for external effect of height and partly for constructional reasons. It places so much material on the haunches of the lower vaults that their oblique thrust becomes a vertical weight, and, by the weight on the haunches of the superior barrel-vault, the thrust on the flying buttresses is reduced to a minimum.

The Dome.—The pendentives and drum and thick lower parts of the dome, to about one-third of the height, would be constructed of masonry and concrete. Above this, it would be of purposely made bricks of light specific gravity, and of such a form that the dome would be erected without any centering. Those used for the outer surface of the dome would be grooved so as to fix the light terra-cotta tiles with which I would propose to cover the dome. The proportion, construction, curves, weight, and thicknesses of this dome have been carefully arranged and determined, and the accurate calculation of weights, thrusts, and strains have been made, in conjunction with one of the most eminent dynamic authorities in England. Access is arranged to all parts of the building, viz., windows, roofs, galleries, domes, and spires, for surveying purposes and repairs. The floors of the church generally would be of stone, and with marble pattern under the dome, but wood blocks might be used for the flooring if desired.

Acoustics.—This subject is of the greatest importance in connexion with a large church suited to modern requirements, but unhappily very little is really known concerning it. This, however, is certain, that echo and reverberation are caused by sound being reflected from flat surfaces within confined spaces. In churches these effects mostly result from bald unbroken wall spaces, bad proportions, piers with flat surfaces, horizontal ceilings, and square-ended transepts, unless the transepts be of such length that the voice, decaying before reaching the end walls, is not strong enough to be unpleasantly reflected. It has been unjustly said that domes are always bad for sound, and St. Paul's is frequently instanced as an example. I maintain that a dome is not necessarily bad for sound, and many Gothic churches have more reverberation and echo than many Italian churches with cupolas. The acoustic qualities depend upon the arrangement. Domes of no great height, on square piers, or over spaces confined by flat walls and without large voids like a nave or transept, into which sound may escape, are undoubtedly bad as far as echo and reverberation are concerned. This is notably shown in the Pantheon at Rome, the Reading-room at the British Museum, London, the Picton Reading-room, Liverpool, Napoleon's Tomb at Paris, the Taj Mahal at Agra, and numbers of the Italian and Indian domes. In these the voice cannot escape, and is reflected backwards and forwards from the flat surfaces. That a low dome is worse in its acoustic results than a high one, is proved by the fact that the reverberation in the first gallery of St. Paul's is much greater than on the floor level, while in the Whispering Gallery the echo is extraordinary, as the name denotes.* The Picton Reading-room is also a local example of this. In fact, to avoid reflection (*i.e.*, echo and reverberation), sound must be either lost in a void, or absorbed by drapery, or deflected and shattered on the confining surfaces. In the plan submitted, to give practical effect to the principles above stated, all lengthened plain surfaces of wall have been avoided, the dome is of great height, and the nave and transepts form large voids into which sound can escape. The large piers supporting the dome are circular on plan, by which means the direction of sound would simply be changed without reflection. The alternate sides of the octagon have semicircular recesses behind the arches, broken by galleries, by deeply-recessed windows, and by double tracery. The pendentives are constructed with a great variety of curved surfaces at different angles, and broken by projecting arches and ribs. Above the pendentives two galleries break the height, also a traceried arcade in front of the deeply-splayed windows. The dome itself is of such a height, that any reflection of sound taking place, in spite of the arcading to the drum and the projecting galleries, would practically be lost, and could not affect either the preacher or the audience. The transepts are as deep as the site will allow, are octagonal on plan, instead of flat, and have recesses at the angles. The aisles are broken by deep recesses formed by bringing the necessary buttresses inside. The surface of the west wall is broken by projecting columns and a gallery. The roofs too are groined."

In regard to the question of decoration, Mr. Emerson observes that there may be one of two systems adopted: first, the church may be treated as a stone interior, with only some carved enrichments, stone figures and canopy work, and stained glass; or, secondly, it may be decorated with colour and mosaics, to which end, "which is far grander and nobler," the surfaces suitable for decoration, such as the spandrels of arches, the soffits of vaults, the pendentives, the large arches, and the cupola are left plain to receive mosaics; but in that case coloured marbles and alabaster, &c., should be introduced in the lower portion of the interior; and the author points out that any such scheme, if contemplated, should be considered and arranged for from the first. "It was the omission, at the beginning, of the consideration of the character of the decoration to be adopted in St. Paul's, that has rendered the decorative treatment so difficult a problem now; and, however this may be treated, it will always cause the lower part of the building to bear a somewhat unsatisfactory relation to the future mosaics on the dome and roof." Mr. Emerson adds that he has thought out the internal architecture in such a way that it might form either a simple monotone church, or be suitable for an elaborate scheme of coloured decoration.

In regard to the cost, Mr. Emerson has commissioned Messrs. Welch & Atkinson, surveyors, to take out the quantities and make an approximate valuation. They find the cubic contents above the nave floor to be 7,394,107 ft., and estimate the cost, including the necessary approaches but exclusive of the residences, at 467,000*l.*

We must not omit to mention an important modification of the site which is proposed by Mr. Emerson. The site on the northern side forms a platform above the steep slope of William Brown-street, the Free Library standing on a similar platform to the north of the said street, which slopes down between the two retaining walls. Mr. Emerson's suggestion is to raise the street to the level of these platforms, making one area of the whole, and carrying down the line of street from this raised area on a gently-sloped bridge to a point in Dale-street, further westward. In conjunction with this alteration, the old buildings on the triangular space facing the west front of the cathedral to be cleared away, and a greater space formed in front of the cathedral, which would be reached by a grand series of steps from the lower level. This would also admit, if desired, of the whole cathedral being moved further west, so as not to be in such close contiguity to St. George's Hall. Something like this idea, we may observe, appears to have been already suggested by a Liverpool architect, Mr. L. F. G. Evans, in a letter to the *Liverpool Albion* of November 1, 1884, a copy of which has been sent to us. It would undoubtedly be a very fine improvement to the site, but it would cost a good deal of money, though not more, from an architectural point of view, than it would be worth.

We have omitted from the text of Mr. Emerson's report (from considerations of space) such portions only as seemed rather necessary for fuller explanation to the committee than for enabling our readers to under-

* The low domical surface of the ceilings of many theatres does well enough because its resonance is great by reflecting sound quickly, while at the same time echo is prevented by the draperies and numerous tiers of boxes and galleries all round, reaching to the ceiling, and the large audiences at different levels. These adjuncts evidently cannot be introduced into churches.

stand and appreciate his views. The full and thoughtful manner in which he has gone into the subject will be quite apparent from a perusal of the foregoing columns. The design as a whole is unquestionably a remarkably bold and original one; it has the merit, so unhappily rare in modern architecture, of being a departure from mere precedent, an effort to think out a design in a form suitable to the special circumstances of the case, and to combine into one whole hints derived from various buildings of various styles. This departure from ecclesiological precedent has already, we observe, been made the subject of local attacks emanating from the Mediæval church party, who apparently think it the greatest merit of a modern cathedral that it should resemble an ancient one. The reasonableness of this view, as we have before suggested, depends on whether the cathedral is to be regarded as built for a church which is to remain established on Mediæval lines of thought and sentiment, and ritual, or whether it is to be regarded as the abode of a modified modern worship, suited to the spirit of the present day. Both views are held strongly by many persons on the two sides of the question, and it is not within our scope to express an opinion as to what ought to be, or is likely to be, the course of the English Church in the immediate future. All we wish to point out is that objections to this design for not being on the orthodox Mediæval pattern only hold good on the theory that the church is to remain on the orthodox Mediæval pattern. In regard to the purely architectural view of the matter, the design appears to us to be a striking, grand, and original one in its main idea and composition. Where we think it partially fails is in a want of homogeneous effect when considered in detail. Externally the whole impression (leaving detail out of consideration) is rather Classic than Gothic. Internally, Gothic feeling is predominant to an extent which the exterior hardly prepares us to expect, except when we confine our attention to special details. The author refers to Peterborough, but he does not realise anything like the massive unity of effect of that unique façade, and the minaret-looking turrets do not combine happily with some other features of the front. The treatment of the buttresses round the dome, on the other hand, is very fine in effect; it is the Gothic buttress and pinnacle cast into a form suited to combine with and support the broad mass of the dome-form. The style of a good deal of the more Gothic detail strikes us as rather heavy. We cannot help feeling that the architect might have done more justice to his very bold conception if he had treated what is in reality a Classic composition with a more Classic form of detail; in fact, that it means to be a Classic design, but somehow or other has worked itself out Gothic.

Referring to one or two special points in Mr. Emerson's report, we fully agree with him that a pyramidal composition is the best for the site. The objections to adopting a fully Classic style we do not think entirely to the point. To say that it is "un-English" might be met by the reply that so is the author's own design, but this objection is only of force in regard to the unsuitability of Classic detail to this climate. It requires modifying for our atmosphere, an experiment which has not been made as often as it might and ought to have been. That Classic is "Pagan," and Gothic "Christian" is an argument that has often been urged, apparently in forgetfulness as to the respective dates of Christianity and Gothic architecture. The earliest Christian Church architecture was Classic, or put together out of Classic materials. If "Christianity" means the Mediæval church, the statement is correct, but only on that understanding. Putting aside the question of climate and its effect upon detail, Classic forms of architecture are more in harmony with modern Christianity, and modern English life and sentiment, than Gothic. In all that is said under the head of plan in Mr. Emerson's report we entirely concur, as well as in what follows in regard to "the reasons for the octagon, and the relation of the dome to the nave," and especially in the opinion that a narrow nave is unsuited to modern services. The reason for the triapsal arrangement of the east end also appear to us to be, architecturally, perfectly sound: the increased dignity of effect from the larger and wider main arches thus obtained round the apse is evident enough in the interior view which we publish to-day. The author gives the same reason for planting out the western towers beyond the line of the aisles which Mr. Brooks gave for his similar treatment; to obtain a spreading west front, and avoid cramping the church up between the towers, as at Cologne,—a crucial example, where the west end seems all towers. The proposal for an entirely fireproof roofing over the vault is much to be commended. We ought long before this to have adopted in modern vaulted buildings, with all the new resources of mechanical means and material, something more monumental and homogeneous than placing a wooden bonnet over a vaulted roof to preserve its surface. In regard to the question of acoustics, Mr. Emerson has seized upon the most important point when he observes that echoes are really and most prominently felt from unbroken surfaces which are comparatively near; but it must be observed that distant surfaces, though echoing less strongly, have the compensating disadvantage that they return the sound at a longer interval after its origination, and, therefore, cause more confusion so far as they are heard; nor do we think domes at a considerable height are quite so harmless in this respect as Mr. Emerson maintains. But, as we have said before, cathedrals are not built for acoustics; all we can do is to make them as little objectionable in this respect as possible. It may be laid down as a general truth that architecture in the highest sense and acoustics in the highest sense are things incompatible. One or the other must give way.

We can easily understand that Mr. Emerson's design may be something of a trial to the architecturally as well as to the ecclesiastically orthodox mind. It is not what they expect or are used to. It may be admitted that the design is not so coherent nor so refined in detail as it might be. But it has the great merit of force and originality, for which many defects of detail might be forgiven; and it is very ably planned for the site and for what we take to be the real requirements of a modern cathedral.

NOTES.

THE Report on the iron trade of 1885, by Messrs. Bolling and Lowe, states that prices and wages are now at the lowest point known for five-and-twenty years. The exports of all kinds of iron and steel, which in 1874 were 2,487,162 tons, rose to 3,496,352 tons in 1884. But only 24 millions sterling were received for the larger quantity, against 31 millions for the smaller, showing a fall in the average price per ton from 14*l.* 4s. in the former year to 7*l.* 2s. in the latter, or a diminution of one-half in the return of this great industry. Exports to the United States have slightly increased in quantity during 1885, as compared with 1884, owing to a demand for old materials and for hæmatite. But this result has been attained at a reduction of 25 per cent. in price. Exports to the Continent of Europe are everywhere barred by hostile tariffs. Coal, the mainspring of mechanical work, has been exported in larger quantities, but, like iron, at lower prices. The figures for the first eleven months of 1885 were 21,994,865 tons exported for 9,843,162*l.*, against 21,685,801 tons for the price of 10,095,808*l.* in the corresponding portion of 1884. Iron ship plates are now quoted at the unprecedentedly low price of 4*l.* 10s. per ton. A remarkable feature of the ship-building trade is the increase in the proportion of sailing vessels built, a class of craft which a year or two ago seemed likely to disappear from the seas. The question of the balance between cost of wages and cost of coal, which, rightly regarded, is the determinant of the lowest cost of railway transit, as affected by speed, is thus being reconsidered by ship owners. In favour of the steamer, however, it must be noted that triple-expansion engines have fulfilled the most sanguine expectations of their working, and have secured an economy of 20 per cent. on the two-cylinder compound engine.

BY the Highgate and Kilburn Open Spaces Bill, which is now before Parliament, it is proposed to give power to the Ecclesiastical Commissioners to convey to the City of London certain lands known as Gravel Pit Woods at Highgate, in the parish of Hornsey, and certain other lands at Kilburn, in the parish of Willesden, by way of gift, for the perpetual use of the public as open spaces. The land at Highgate consists of about 69 acres, and is bounded on the east by Southwood-lane, and on the western side by the Great Northern Railway's Edgware, Highgate, and London line, and the Alexandra Park Branch Railway. The land at Kilburn contains about 30 acres, and forms part of a much larger area belonging to the Commissioners. It is bounded upon the north-west by the Tottenham and Hampstead Junction Railway, on the north-east by Salisbury-road, on the south-east by the London and North-Western Railway, and on the south-west by Chamberlayne Wood-road. Approach roads to these open spaces are proposed to be formed and maintained by the Commissioners until taken over by the Local Authorities, but the Corporation are not to be liable for the cost of paving or lighting these roads. The Corporation are empowered by the Bill to raise a sum not exceeding 15,000*l.* for the purposes of the Act, and are further to be permitted to dispose of a sum of 20,000*l.*, with accumulations now in their hands as the residuary legatees of the will of the late Mr. William Ward, who left the whole of his real and personal estate (in addition to a legacy of 20,000*l.*) to the Corporation for the erection or maintenance of some institution or the creation of some fund for the benefit of the poorer classes. The Bill proposes to declare that the maintenance of these lands as open spaces would be such a benefit, but it is open to doubt whether this was within the scope of the testator's intentions.

THOUGH the Home Office inquiry respecting the condition of the dwellings of the working classes in Mile End does not reveal much that was not hitherto known, it is satisfactory to find that attention is being directed to the subject. The hamlet of Mile End, although it undoubtedly contains a large number of insanitary dwellings, is, we fear, not much worse in this respect than some other districts of the metropolis. We say this with regard both to ordinary house or "cottage" property and the so-called "model" dwellings which are reported as "unfit for human habitation." We have on previous occasions called attention to the sanitary dangers inherent to large blocks of tenements in flats unless the buildings be properly planned and constructed, and possessed of adequate means of light and air. These dangers were well pointed out by Mr. P. Gordon Smith, the Architect to the Local Government Board, in a paper read at the Sanitary Congress at Leicester last autumn, of which we gave a report at the time (see *Builder*, Sept. 26, 1885, p. 442). Mr. Gordon Smith's experience, irrespective of his official position, entitles his opinion on such a subject to great weight. The subject was also discussed at a recent meeting of the Association of Public Sanitary Inspectors, and the sanitary evils of badly-planned and constructed dwellings in flats were pointed out with much force by experienced officers. For town dwellings the "flat" system has undoubtedly many advantages, but unless it is to fall into disrepute (for which we should be sorry) in future buildings of the kind sanitary conditions at least equal to those of the best buildings of their class must be strenuously insisted upon by the public authorities, and private or corporate speculators anxious for good dividends must not be allowed to minimise those conditions below certain necessary and practicable standards.

AT the business meeting of the Institute of Architects on Monday, the proposition moved by Mr. Lacy W. Ridge, "that it is undesirable to maintain the disability to take out quantities under which Fellows now labour in consequence of the declaration made by them under By-law XXI.," having been duly seconded and a good deal discussed, was negatived by a large majority: a decision in which we entirely concur. The resolution does not properly represent in its wording the real state of the case, as what is objected to is not the taking out of quantities, but the acting as quantity surveyors for other architects, or rather for the contractors employed by them. The position is not in accordance with the professional dignity of Fellows of the Institute, and quantity-taking is no part of architecture, nor is it necessarily even a part of architectural practice, though every architect should understand it. Mr. Phené Spiers's resolutions tending to the equalisation of the Fellows' and Associates' subscriptions were finally left as suggestions merely, and not formally put; and Professor Kerr's motion, of which notice had been given,—"That the Council be requested to call a special general meeting under the By-laws LXXI., LXXII., and LXXIII., to consider the expediency of suspending the By-laws regulating the process for electing the Council so far as to admit of a ballot of the Fellows, and, if possible, of the Associates, being taken by voting-papers without personal attendance, as part of the said process of election on the next occasion," was dropped for want of time. Much talk and little done. The drawings of the Pugin Student, Mr. Bidlake, which were hung in the room, were much and deservedly admired. They consist of sketches from Lincoln and the neighbourhood. The President referred to the death of Mr. Fergusson in a few words which we have given in another column.

THE fourth article in the current number of the *Edinburgh Review* will be found well worth attention in these times of commercial depression. The writer, at the outset, implies that the Joint Stock Companies Acts have, on the whole, been a curse rather than a blessing, and the facts he adduces certainly go very far to support that view. He shows, by extracts from the "Report of the Select Committee on the Companies Acts, 1862 and 1867" (published in 1877), and from other Blue Books and Parliamentary papers, how the provisions of the Acts have been abused by company-promoters. Although the Acts were passed in the belief that joint-stock adventures would prove beneficial to the community, to trade, and to the investment of capital, their abuse has no doubt, as the writer says, ruined large numbers of credulous persons, contributed to the depression of trade, and led to the loss of an enormous amount of capital. With regard to practicable remedies for the abuse of the Acts, the writer says:—

"It would not be very difficult to introduce changes in the existing law which could go far to check the worst of these abuses, without interfering with the legitimate objects of association, which are sometimes highly beneficial. We see no reason why a heavy stamp duty should not be imposed on the articles of association or on registration, without which they should be invalid. This duty might fairly be fixed at 2½ per cent., and it should be assessed on the nominal value of the company. That would amount to 25*l.* on every 1,000*l.* of nominal capital,—not an unreasonable charge on a sound undertaking. Such a tax would at once extinguish all those ephemeral schemes professing to start with an enormous capital, of which not one-tenth part has been paid up or has any real existence, and when paid it would afford some guarantee of the solidity of the enterprise.

But the responsibility of directors is the key of the position. Even if the liability of shareholders is limited, we see no reason that the liability of directors should be so. They are the managing partners in the concern. They know its resources and its exigencies. They have the power to incur debts and issue debentures. If directors were personally liable for the transactions they conduct, as trustees for the body of shareholders, who know nothing of the details of management, and if they were compelled on their election to give some sufficient evidence of their own ability to meet the engagements they contract, the whole fabric of 'bogus boards' and men of straw would be swept away."

In conclusion, the writer remarks that the French law on the subject is in some respects superior to our own; and he expresses the hope that the subject may receive early attention at the hands of the new Parliament, "if it is able to accomplish any good work in the shape of practical legislation; for, although such matters are less exciting than political debates and party divisions, they are infinitely more useful and important to the nation."

NOTHING is more indicative of general progress than activity in the building trade, and as such a condition is not usual when rents have a downward tendency, it is evident that the advance in rents which is said to be taking place at Berlin augurs well for the future prospects of building industry in that city. It is possible that those interested in the growth of the German capital may be forming an exaggerated idea of its probable development, but the tendency of opinion in this direction is indicated by an estimate referred to in the *Deutsche Bauzeitung*. According to this calculation, the population of Berlin will probably amount, in 1890, to two millions, and ten years later to double that number. Building has not yet, however, displayed that activity which might have been looked for under these circumstances, but it is expected that an early revival is assured, one indication of a better state of things being a reduction of the number of forced sales of real property, from 783 in 1878 to 140 in 1885. The present advance in rents would seem to be practically a return to those paid before 1878, the official statistics showing, in the years 1878-1880, reduced valuations in 30,333 cases, against increased valuations in 2,750 cases, while in the years 1882-1885 the total of increased valuations was 31,302, against 8,547 in which a reduction was notified. The movement in each case was progressive, the number of increased valuations in 1885 being 14,956 against 8,452 in 1884. The number of unoccupied houses has, meanwhile, diminished by more than a third. It is instructive to compare the number of houses erected in 1875-1878 (2,255) and in 1879-1882 (948) with the movement of rents, as described above, and when the facts are taken into account that the annual increase of population has augmented from 31,480 in 1875 to 42,000 in 1885, it will be seen that the new buildings for 1883-1885 (842) are in number sufficiently below the average of the eleven years under review to account for the increase of rents to which reference has been made.

WITH reference to the proposed application of compressed air, to be supplied from a central station as a motive power, now contemplated, it will be useful to bear in mind the real cause of the failure of the atmospheric system of railway propulsion, which was taken in hand by Mr. Brunel in this country, and by M. Eugene Flachat in France. There were, no doubt, mechanical difficulties with the longitudinal valve; but there is good reason to think that they would ultimately have been overcome. The true, and insuperable difficulty was not mechanical, but physical. As the air in the main was rarified by the action of the air-pumps, the heat of the earth rushed in, and raised the temperature of the rarified air, raising its tension at the same time. Thus the air-pumps were actually engaged in pumping out the endless supply of terrestrial heat; and, indeed, at some of the stations on the South Devon line, the cylinders became nearly red hot. There was no dealing with this state of things. In the case of compressed air the reverse action must, to a considerable amount, take place, and the first question as to the economy of this very elegant mode of communicating power will have to be settled after thermometric experience has been obtained. It will be well to give timely attention to a feature in the case as to which Nature will not fail to assert her laws.

THE revenue of the London, Brighton, and South Coast Railway for 1885, instead of showing the normal increase of about 70,000*l.* over the previous year, shows a falling off of 56,000*l.* For the half-year the decrease of revenue has been 34,000*l.*, to which has to be added an increase of 14,000*l.* in charges on capital. On the other hand, there has been an economy of nearly 22,000*l.* in working expenses, including the reduction of Government duty, showing a net difference of 28,000*l.* to the bad, which falls on the ordinary and deferred stock. The dividends proposed are at the rate of 3*l.* 2s. 6d. per cent. for the half-year on the undivided ordinary stock; 3*l.* 10s. on the preferred ordinary stock; and 2*l.* 15s. for the whole year on the deferred ordinary stock; carrying forward a balance of 5,900*l.* At the corresponding period of last half-year the dividends were respectively 5*l.* 10s. and 3*l.* for the half-year, and 3*l.* per cent. for the whole year. The dividend on ordinary stock, of which 1*l.* 5s. per cent. was paid in July, thus averages 4*l.* 7s. 6d. per cent. for 1885, against 4*l.* 10s. for 1884, and on the deferred ordinary stock the decline is from 3*l.* per cent. to 2*l.* 15s. per cent. for the year.

THE results of burning naphtha for the locomotives on the Trans-Caspian Railway, as compared with the only other fuel there available,—wood—have lately been published. They are to the effect that the work done costs only one-fourth as much by the use of the former as compared with the latter fuel. The amount is given in the Russian dimensions of sajeens, poods, versts, and kopeks, which are unfamiliar to the English reader. The difficulty of rendering them in English equivalents is increased by the arbitrary and shifting value of the rouble, as it is not stated whether silver or paper roubles are used. If we assume the latter to be intended, and if we value it at 2s. (a halfpenny more than the last quotation we have seen), the price given as 7 kopeks per pood is equal to 0·0466 per pound for the naphtha. The consumption, 64 poods per verst, is equal to 3,480 lb. avoirdupois per mile. The price per mile, cited as 4·57 roubles per verst, comes thus to about 15d.; while for wood, with a consumption of 442 cubic feet, the cost amounts to 9s. per train mile. These figures, if they do not bear out the statements of the extraordinary results to be obtained from the use of petroleum refuse, at all events show what gigantic efforts Russia has been making for the establishment of the Trans-Caspian lines of railway.

ON Saturday, the 16th, there was opened at the École de Beaux Arts in Paris an exhibition of the designs of the late Auguste Joseph Magne, architect, and honorary Inspector-General of Public Works, who died in July, 1885. The drawings exhibited include the design for a cathedral, which gained him the second "Grand Prix" in 1838; the drawings for the église St. Bernard, the Théâtre de Vaudeville, and of various public markets which he constructed in Paris, and those of the Théâtre d'Angers. There are also designs for sepulchral monuments, and some water-colours of great interest. A biographical notice by M. Lucien Magne accompanies the catalogue.

AT the last celebration of the "Winckelmannsfest" in Berlin, Dr. Robert laid before the Archæological Society the full programme of the great work on Greek and Roman sarcophagus reliefs which is to be published by the Institute. He also showed a few specimens of the plates of the first volume, which, it is hoped, will appear in the course of the present year. The work, it will be remembered, was projected long ago by Dr. Jahn, and begun by Friedrich Matz; retarded for a while by his early death, it is now carried on under the excellent editorship of Dr. Conze and Dr. Robert. According to Dr. Robert's account it has been found possible to draw a clear line of demarcation in that usually debateable borderland of Græco-Roman and Roman work. In the Greek work each sarcophagus is conceived as an architectural whole, and the design of the relief is superadded, as decorative ornament. In the Roman work, influenced as it was by Etruscan style, the sense of architectural condition is wholly lost, and

hence the design of the relief is no longer decoratively treated. All the sarcophagi are classified under four heads. The first and most numerous class are decorated with scenes from daily life (the *vita communis* section, as Dr. Robert calls it), scenes of marriage, hunting, palæstra, death and burial, and the like. Secondly and thirdly come mythological scenes, *i.e.*, secondly, mythology proper, scenes from popular cycles, such as the Trojan war, myth of the Argonauts, labours of Herakles, also symbolic myths, Meleager, Adonis, Alcestis; and thirdly, mythologico-decorative scenes, where the meaning is more or less subordinate to decorative intent. Fourthly come designs purely decorative.

AT Naukratis the Egyptian explorers have been rewarded by finding a colossal statue bearing the name "Aam," which, as the name is geographical as well as personal, would seem to denote that the place was a Libyan name of importance. The explorers of the Greek necropolis have, for the most part, lighted only so far on a number of objects in terra-cotta, which have served to decorate coffins; the coffins themselves, being of wood, have perished. It is noticeable that part of the necropolis seems to have served as a burying-place for dead animals, whose bones, found in great quantities, are much corroded by the damp earth. The boundary-walls of the temples of the Dioscuri and that of Aphrodite, have not yet been completely laid bare but four pillars belonging to the Dioscuri temple have been discovered, which are interesting, from the fact that they are made of unburned clay, and decorated with painted figures of oxen. Some painted terra-cottas have also been found, which seem to have served as a lining to the walls. In the Aphrodite temple a number of votive vessels have been discovered, of the local fabric. A short account appears in the *Philologische Wochenschrift* of January 16.

IN Dr. Loewy's "Altes Stadtrecht von Gortyn und Kreta," the public have before them for the first time a full and circumstantial account, with an intelligible rendering and commentary on the famous Gortyna inscription. The discovery is of exceptional interest to the general public, as well as to the specialist, as the inscription is so long and so excellently preserved that it presents us with a large portion of the legal code of Crete. Minos, the mythical conqueror of Crete, ruled so well in the upper world that, after death, he was promoted to be judge over "the strengthless heads of the dead" in the shades below, and the legends of his government, we are sure, contain some kernel of historical fact in the economy of the early island politics. The inscription is full of curious and detailed information about the relations of buyer and seller, slave and master, and contains minute enactments as to divorce, and thus incidentally gives a lively picture of ancient life and manners, and in many points forms a commentary on the legal speeches of Athenian orators.

A STUDIO which has just been established in High-street, Notting Hill, is likely to be of some service to those who for any purpose require original designs in the Arabian or Persian styles or in that mingling of them called "Turkish," and who, while wishing for the real thing, do not want the trouble of sending abroad for it. The manager employs a staff of Armenian artists, the chief of whom claims to have been the principal designer of decoration for the Palace of the Sultan Abdul Azziz, at Constantinople. Some of the designs already produced are of considerable merit, and a collection of the best, which is to be issued, will certainly be interesting. We must not omit to add that the execution of the designs is also undertaken, and that many are applicable to metal-work and embroidery.

ARCHITECTS who have competed for the Fulham Vestry-hall, the designs for which we noticed some time ago, are beginning to ask when they are to hear the result. The inquiry is the more pertinent, as we understand that Mr. Currey's award has been made. If so, why are not the results published? Is this to be a new tale of jobbery?

THE LAST OF TAVISTOCK ROW; OR, NEW FLOWERS IN AN OLD GARDEN.

"I've had to-day a Dozen Billets-doux
From Fops, and Wits, and Cits, and Bow-street Beaux;
Some from Whitehall, but from the Temple more;
A Covent-garden porter brought me four."

DRYDEN (Epilogue to "King Arthur"; spoken by Mrs. Bracegirdle).

FOR a longer period probably than any similar open space in London, Covent Garden has been used for purposes but little different in kind from those it originally served. Fruit and flower dealers and their porters traffic in what they term "the garden," — its site identical with that of a pleasaunce and herbarium enjoyed by the monks of Westminster. Situated by the ancient prebendal manor of Rugmere, it lay between Queen Matilda's hospital for lepers, — endowed with a sub-manor of St. Giles, which was separated out of Rugmere,—and the little village church dedicated to St. Martin. In 1222 was enacted the Primate's decree for readjusting the boundaries of St. Margaret's parish. As early as that date we have mention of the area by name of Frère Pye Garden. Yet so retired and remote was this spot that it scarcely comes again within the range of topographical inquiry until the sixteenth century. Henceforward we may clearly see to how significant an extent the local names of this quarter are eloquent of subsequent changes. Eastwards of the Convent Garden* we find a Via de Oldwich or Aldwych, running to Aldwych Cross in the now Broad-street, St. Giles's; and without its western wall a thoroughfare which, for long after the establishment of St. Martin's-in-the-Fields as a distinct parish (1535), was called West Church (now St. Martin's) lane. A by-way, mentioned in 1612, through the Elms Close or Seven Acres to the north, marked the course of the modern Long Acre.† But the Abbot of St. Peter's,—whom, by the way, W. S. Landor, in his "Imaginary Conversations," strangely confuses with a lady abbess and her cut salad,—had perforce to surrender his garden, together with other possessions; and at the Dissolution this ground passed into Henry VIII.'s hands. His son granted it to the Protector Somerset.

Reverting to the Crown at that duke's attainder, it was regranted, in conjunction with the neighbouring seven acres, to John (Russell) first Earl of Bedford of that house, in May, 1552, who converted most of the land into pasture-ground. It was either that nobleman or his son, Francis, who built in the Strand, and opposite to their former home, the Bishop of Carlisle's "inn," what Strype describes as "a large but old-built house, having a great yard before it for the reception of coaches, with a spacious garden, having a terrace-walk adjoining to the brick wall next the garden." The front yard was entered from the Strand. The "brick wall next the garden" is the southern wall of Covent Garden. Two plans are before us,—the one of *circa* 1680, the other of 1690. Bedford House (it was constructed mainly of wood) extends from the Strand to the southern side of Maiden-lane, covering the present Southampton-street.‡ Northwards lies the House garden, having an additional plot or smaller garden to the east. This entire garden blocks the eastern end of Maiden-lane; towards the east it is separated from the stables by a passage, which corresponds with the later Tavistock-court. The stables are entered in the south-western corner by a way, leading from the courtyard, which has since been supplanted by Tavistock-street; they have also a gate at what was then the elbow of York and Charles streets. This latter street has since been prolonged southwards (as Wellington-street), over the site of the gateway, which faced northwards, and the adjacent part of the stable-yard. The court-yard has another approach, from the end of Exeter-street, since Denmark-court. In the plan of 1690, the gardens have three rounded projections, of which two turn out of the northern wall, the other to the west behind Maiden-lane. It is plain, then, that the Russells' garden did not reach westwards to beyond Southampton-street. About 1630, Francis, fourth earl, laid out the market square,—three acres,—with its Piazzas, from Inigo Jones's designs. The northern and eastern blocks were of red brick, with pilasters, and with dormers in the fourth story; the arcade of stone. From a comparison we have made of several views, it would seem that the dormers were removed for an attic floor about 1825; the premises between James-street and the New Club (*antiquè* "Evans's"), that are being prepared for the Bedford Hotel, give a fair presentment of the original elevation, as shown in Sutton Nicholls's and J. Maurer's views of 1720 and 1753 respectively.

To Francis's eldest son William, advanced Duke of Bedford May 11th, 1694, King Charles II. granted a charter of right, in freehold, to hold a market here for fruit and vegetables; the charter being subsequently confirmed by two regulating Acts, 53 Geo. III., c. 78, and 9 Geo. IV., c. 113. Strype mentions the appearance, within four years later, of the grove or small grotto of trees, most pleasant in the summer season, beneath which they used to hold market. This avenue lay just along the northern garden-wall of Bedford or Russell House. But on the demolition of the house in 1704 both wall and avenue disappeared too, and the erection of Tavistock-row on their site forced the dealers further into the square. Soon afterwards the stalls gave way to the booths and even two-storied dwelling-houses, but only along by Tavistock-row, which we see in the old prints; and it is not before 1754 that we find the square generally covered by the market. The central Corinthian column with dial and sphere at top is stated to have been set up in 1668, according to the churchwardens of St. Paul's accounts, as quoted by Peter Cunningham. It certainly figures in a little print: John Seller, *excudit.*, in the Crace Collection, to which a date (1640) is assigned, and which has all the air, including the costume and certain local details, of that date; though it may have been introduced into a later state of the plate. It does not appear in Hollar's view of 1640. The column was taken down in 1790, and its golden ball was subsequently placed in the garden of John Kemble's house, No. 89, Great Russell-street, Bloomsbury.

In Covent Garden-square Hogarth lays the scene of his "Morning" (1738), the picture that was exhibited a few months ago at Burlington House, and his "Rich's Glory." The latter view is taken from opposite to Tom's Coffee-house in Russell (then Great Russell) street. The print, sold for 6d., was speedily suppressed, probably owing to its figure of Pope, who is testifying in a most unmistakable manner to his contempt for the "Beggars' Opera" and Rich's triumph. The former shows the portico of St. Paul's, and the Dutch elevation (since altered) of Lord Archer's house,*—the Paddy Green's of a few years ago. But here Hogarth fails of his customary accuracy. He puts Tom King's Coffee-house before the church portico, where the Westminster hustings used to be set up. But King's real station was in the south-east of the square, opposite to Tavistock-row, and close to that of its equally notorious compeer, Mrs. Butler's "Finish." Hard by, too, in this corner was established Powell's Punchinello, of whose counter-attractiveness the under-sexton of St. Paul's makes plaint in Steele's No. 14 of the *Spectator*, the 16th of March, 1711,—"I have placed my son at the Piazzas to acquaint the ladies that the bell rings for church, and that it stands on the other side of the garden; but they only laugh at the child." These ladies, by the way, would pay 2s. 6d. and 1s. 6d. for admission, and were enjoined not to wear masks or riding-hoods. So much of the eastern or Little Piazza as stood between Russell-street and Tavistock-row was destroyed by fire on March 20th, 1769. At its angle with Russell-street (southern side) had stood the celebrated Mrs. Dubois' (afterwards the Three Chairs) tavern. This was next occupied by Small's and subsequently Rigg's Bagnio, the cupping-house known as Hummums. In

* The corruption "Covent Garden" is employed in two inquisitions, quoted by Peter Cunningham, of respectively 9 and 28 Elizabeth; and in a lease from Francis Earl of Bedford to Sir Wm. Cecil (Lord Burghleigh), of 7 Sept., 1570. Yet in Chamberlayne's "Notitia," 1726, we read Convent Garden.

† Hart-street, Covent-garden, was formerly styled Elm-street.

‡ In a plan, Strype's Stow, 1720, this is named Bedford-street; and the lower portion of Bedford-street, as now, is named Half Moon-street.

* Built for Edward (Russell) Lord Orford, victor at La Hogue. The view is reversed in the prints.

Little Piazza lived Thomas Southerne, author of Oroonoko and the Fatal Marriage, and friend of Dryden, Pope, and Gray; and, next door to the King's Arms tavern, Dr. Berkeley, bishop of Cloyne, to whom Swift's "Vanessa" bequeathed 8,000*l*. It was to the old Hummums that Dr. Johnson's wife went to learn what she might about the apparition of Cornelius ("Parson") Ford, nephew to Dr. Johnson's mother, who, as Johnson says, died there 1731. The days of the new Hummums likewise are numbered. It is at this date being demolished for completion of the Flower Market-house, which was recently erected over the old site of Bedford House stables. Moreover, it is in contemplation to supply additional market buildings for the sale of flowers and herbs, where the garden of Bedford House formerly stood. So Tavistock-row also, its front much modernised of late, has at length gone, the last house to fall being one that remained until three or four weeks ago. This was the dismantled house; Maurice, the book-dealer's, being No. 13, wherein have lived Zincke, the famous enameller and miniature painter, and Nathaniel Dance. In that house, too, Dr. Wolcott began, under the *nom de plume* of Peter Pindar, his literary career with his once popular "Lyric Odes to the Royal Academicians" (1782-6), and wrote *inter alia* "The Pilgrims and the Peas," "Bozzi and Piozzi," and his satirical attacks upon the Royal family. At No. 4 in the Row, north-west corner of Tavistock-court, Lord Sandwich, when purchasing some neckcloths,* first saw Miss Reay, who met with her tragical fate at Hackman's hands as, with two friends, she was awaiting her coach in the Piazza after a performance of "Love in a Village" at Covent Garden Theatre. In that same house Charles Macklin, whom Murphy happily named the black-letter copy of Macbeth, passed the close of his lengthened life, having been a constant visitor for more than thirty years at the Antelope in White Hart-yard close by; and in the adjoining house (No. 5) lived and died William Vandervelde the younger; and Thomas Major, engraver to the Court and the Stamp Office, who in 1784 furnished in twenty hours a perfect substitute in brass of the Great Seal that had been stolen from Lord Chancellor Thurlow's in Great Ormond-street. For our readers' convenience we have used above the four cardinal points of the compass, but, in point of fact, Tavistock-row faced to north-west-by-north.

SOME LESSONS FROM OLD GLASS.†

THE difference between stained and painted glass is one mainly of terms; for painted glass is almost invariably stained also, and stained glass painted. Indeed, in the case of absolutely unpainted work the term technically used is *leaded* glass,—which again is not so absolutely discriminative as it would be if painted glass, too, were not (as I have said), for the most part, more or less leaded. It is, in fact, the more or less of paint which makes the term "painted" applicable to coloured windows generally; although, correctly speaking, it may be said best to describe the windows of the worst period.

The Early Gothic windows are clearly only a carrying further of the idea of *mosaic*. They are merely mosaics of translucent glass supplemented with paint. This supplement of painted detail was added probably from the very first, the strict mosaic of differently tinted bits of glass having been most likely even then used mainly (as it is now) for the sake of economy.

Yet there was something to be done in purely mosaic glass, or glass mosaic,—much more than was ever attempted. The pity is that economic considerations, rather than artistic, have regulated its development, or, more properly speaking, ruled its degradation.

It may be taken for granted, notwithstanding the abstract character of savage ornament, that mankind naturally prefers pictures to anything in the nature of ornamental design. And no one would think of denying that this bias has led to a higher form of art than any mere pattern-work. But it is nevertheless to be regretted that the branch of art called "fine" has been cultivated practically to the exclusion of art ornamental, which has been so generally adopted for the strict purpose of saving only, that that has come to be thought almost its *raison d'être*. To apply this to the subject in hand, the aspiration towards figure-design leads immediately to the use of paint on glass, and so to a neglect of the capabilities of another sort that lie in mere glazing. They have never been tested. I maintain that even in figure-work, if only on a very large scale, and at a sufficient distance from the eye (as, for example, in the clearstory of lofty cathedrals), splendid results might be obtained without any use of paint whatever. None but those who design for glass can realise how little the coarse lead-lines, cunningly disposed, interfere with the actual forms of the design in glass. The amateur does not suspect the amount of leading in the windows he admires, and would scarcely believe, if he saw the cartoon first, that the leads would be so little noticeable.

The difficulty in designing for a building of great size is to be bold enough (witness the recent experiments at St. Paul's), and the leading necessary in absolutely mosaic figures would compel the artist to be bold,—bolder, perhaps, than he would otherwise dare be. The windows immediately under the dome of St. Paul's suggest a position where leaded figure-work would be all that one could wish. At that distance from the eye, and on the scale necessary at such a height, the folds of drapery might obviously be leaded up in any variety of shade that was desired, and even the flesh tints might equally be glazed up. Imagine the cartoon of a head "blocked in" after the broad effective French manner made familiar to us by M. Legros,—the shadows, that is to say, laid in as masses of broad flat tint: it would be a very simple thing to glaze up these masses in the right shades of glass, and the lead lines bounding them would, at that distance, be inappreciable, if, indeed, they were to be detected. I remember that in the windows at King's College Chapel at Cambridge, which are comparatively near the eye, the heavy saddle-bars in the upper lights have about the value of an ordinary lead-line, whilst the lead-lines themselves go practically for nothing. You will, perhaps, be the readier to believe in the possibility of what I suggest if you think of the way in which the tesseræ of ordinary mosaic are lost in the general effect of colour. It seems almost impossible, when one sees it near the eye, to persuade oneself that such brutality of line as the mosaicist uses can be made to produce so delicate an effect.

However, it is not very often that there is an opportunity for figure-work on the scale necessary to its satisfactory execution in pure glazing, and, where there is, no committee (every big thing now is controlled by a committee, more or less incompetent by its very constitution) would be likely to venture on the experiment. What there is ample opportunity for is mosaic ornament, which is so much more amenable than figure design, and by means of which the richest possible effects of colour might be produced at a cost comparing with the common painted work, which has a way of always advertising its own cheapness,—only it would take more brains to do it. I do not mean to say that those who resort always to paint have no brains; but they economise them, as they do when they give in their adherence to traditional and worn-out types of glass design. They are, indeed, far too clever to admit,—what they must as artists own to themselves,—that their orthodoxy is the doxy of the tradesman sustained by a very present fear of profits failing off.

The more I see of old glass,—and I have studied it at home and abroad for the last twenty years,—the more I see how much there is in it to admire and wonder at, and the more I realise how ill-advised we are in copying it. We can gather from it, first and last, nearly all that is needful to know about the treatment of glass,—but the one thing for which it affords neither pretext nor precedent is the mock antique.

The art of glass-painting followed the course of contemporary art, up to its culmination and down again to its decline, from good to better, and from bad to worse; and from almost every phase through which it passed there is a lesson to be learned, but to adopt any one phase, even though it were the best, as our model, and to limit ourselves to the imitation, affectation, or reproduction of that period, seems to me out of the question.

The contemplation of old work inspires me at least with a desire to do something too, but something different. The thought of how beautiful it is, is followed immediately by the reflection how impossible it is for us to repeat it without insincerity; and the regret that we cannot go and do that any more is tempered by the consolatory conviction that, thanks in no small degree to it, we can do something that is also worth doing, and which they did not do.

Apart from any personal objection to imitation (and I admit that mine is very strong), it seems to me that neither the earlier mosaic nor the later pictorial glass can be taken by us as an adequate "authority," and this not only because we live in our own century, and must march in step with it, but because neither is enough. The early work does not go far enough in the direction of technique, whether in respect to composition, drawing, or painting; and the later windows go too far in the way of ignoring the better principles of glass-painting taught us by the earlier craftsmen. To put it in other words, the thirteenth-century glass is too crude in its conception, too rude in execution, too entirely out of touch with the modern notion of art; the later work, with all its technical perfection, falls far below the ideal of a workmanlike use of the capabilities of glass.

We cannot conceivably limit ourselves to glass such as now forms the glory of many a Gothic cathedral, nor can we entirely dismiss all that from our minds and be content with Cinquecento picture windows. To fuse the two styles into one is, very likely, impossible; but it is possible, it seems to me, to deduce from both principles which shall guide us in producing something as good as can be done, without overmuch perplexing our minds as to the style by name of which it shall be labelled. If it is really after the manner of glass it will not be found wanting in style.

Very hard things have been said, and I am one of those who have said hard things, of Renaissance glass; but that was in the days when I was bitten with the belief that every good think was included in the styles called Gothic. I am less rabid now that I am older and have seen more and thought more, and I want to persuade you too that there are qualities in later styles which are worth our admiration and respect, and that we shall not reach the highest level in our art,—architecture, glass-painting, or whatever it may be,—without having learned something from all of them. There are few that can teach us only what to avoid. The tide of popular enthusiasm has turned now away from Gothic; but under no circumstances can the glass-painter ignore it, for the later styles will not teach him all his trade.

It will always depend very greatly upon our immediate purpose whether there is more to be learned from one style or another. The earliest glass will be useful to us, mainly as a guide in church work, and that especially on a fairly large scale; in a building, that is to say, in which the object is to shut out or greatly to subdue the light, and where the dimensions of the building and the scale of its detail are such that the simple forms of the glass do not appear proportionately coarse. Some of you will remember an earnest attempt that was made, not so many years ago, to introduce into the homes of the nineteenth century a rude and rigid form of Gothic furniture, with the result that it looked like Hodge in the drawing-room,—loutish, clumsy, out of place. The would-be reformation was not nearly thorough enough.

A similar incongruity occurs wherever the unmitigated forms of Early Gothic glass are inserted into windows of buildings other than reproductions of thirteenth-century churches. Thank Heaven, we have not yet suffered from domestic dwellings after the Early Gothic manner, rush floors and all. What, I wonder, would Baron Huddlestone say to a really Mediæval court of law?

In churches, halls, and other large public buildings, we might, as I have said, not only model our practice upon that of the first glass-painters, but we might even out-Goth the Goths, and make mosaic glass that was more purely mosaic than anything they have left to us.

So far as big, bold, simple work is concerned, so good; but there ends the adequacy of the primitive models. In the windows of the smaller chapels of a cathedral, or in the windows of an ordinary parish church, and most especially in domestic windows, which are now assuming some importance in the glass-painter's calculations, mosaic will not of itself suffice.

* J. Cradock's "Memoirs," vol. i., p. 117; he, though, places the shop in Tavistock-street.

† A paper, by Mr. Lewis F. Day, read before the members of the Architectural Association on the 15th inst.

We must go for inspiration to Renaissance glass or Transition work, or, at any rate, to the very latest phase of Gothic, to work, that is to say, not much earlier than about the year 1500.

The very perfection of glass-painting, as such, is attained in cinque-cento windows, such as those at St. Gudule at Brussels. The breadth, the dignity, the monumental character of their design, is unsurpassed, the drawing is the very best that Flanders at that time afforded, and the painting is something in the nature of a *tour de force*. (Therein, in fact, is its weakness). To have seen such work, and to have appreciated it, is to be incapable ever afterwards of going back to the ideal of thirteenth-century art. It is not as if our whole choice lay between the two. If I believed that, I, for my part, should be disposed to toss up the whole thing in despair.

It is not only in the matter of painting that this glass, and much other of the period, stands superior, but, as I have said, in drawing, and often in design. There is nothing in early work to compare with the large spirit in which it is conceived. There is often a simplicity and straightforwardness about the composition that is not to be excelled. In fact, the composition of some of the windows in the Chapel of the Holy Sacrament is of a naïvety that one would be disposed to attribute rather to a designer of the thirteenth century than to Michael Coxcie or his master, Bernard Van Orley, who had studied in Italy to such purpose that his paintings have been passed off as the works of Raffaelle.

These are, of course, superlative examples. The later glass-designers had not all that admirable self-restraint, that sense of fitness, that supreme quality of style, in short,—far from it. But, for all that, there are generally to be found in windows of the early sixteenth-century qualities, more or less pictorial, which we cannot at this period of the world's wagging do without. That men who lived before us knew not of them and were content, will not help us.

Why, then, can we not follow these later lights? Are we so much greater than they? No, but we have seen what their neglect of the qualities most characteristic of glass led to; we come after the event, and it is easy to be wise.

The error of their ways lay, in a word, in too exclusive a reliance upon painting. How far they were ignorant of the nature of glass, and how far only impatient of the restraint it would have imposed upon them, may be open to dispute. It is certain, however, that the painters of this period (who, by the way, were painters, and not glass-painters by craft) sought to do in glass just what they would have done on canvas; and, if the truth must be told, some of them very nearly did it, but never quite. The result is in no case all that it might have been on canvas; and I contend that it might easily have been finer had they relied more upon glass and what could be done in it. The wonderful degree of success reached by force of art, in spite of the material used, makes us wonder what such men might have done had they known, had they cared, more about glass.

The unfortunate effect of depending upon the use of paint in glass is most conspicuous in the windows of later date, when the decadence was already far advanced. You see it, on a vast and gradually declining scale, at Gouda; and you see it very manifestly in the windows ascribed to the pupils of Rubens in the south chapel at St. Gudule itself, where during great part of the day colour is eclipsed. But the evil exists, not altogether latent, in the splendid windows in praise of which I have said so much. Take, for example, the deeply-shaded soffits of the canopy arches, against which the golden swags tell so splendidly: it cannot be doubted that if that coffering had been leaded up in browns and "pot-metal" yellows, instead of being so heavily loaded with paint, a richer quality of colour might have been obtained. So also with the canopy work altogether, if the shaded portions of the masonry had been glazed in shades of deeper-tinted glass (as was actually done, here and there, in work of about the same period, by men more thoroughly imbued with the traditions of Mediæval glass-painting), the gain in translucency and brilliancy would have been very considerable; and surely it is translucency, brilliancy, and richness of colour that one can least afford to sacrifice on glass.

A glass-designer has, so to speak, to think in glass; and the men of the Renaissance, being more painters than anything else, did not sufficiently think out their thought in the language in which it was ultimately to be expressed.

The vice of over-painting was inherent from the very first in the art of glass-painting, growing with its growth, already by the time of its culmination deeply rooted, so that we can point to no one period as being absolutely the best in the history of glass-painting. With the most perfect *technique* we have the fault of obscurity already strongly marked. If we go back to the period previous to the development of the evil, we find that we have gone back too far for perfectly-developed *technique*.

But if we can define no period, we can point sometimes to specimens in which the happy medium seems to have been as nearly as possible found,—where the painting has been carried to the highest point without undue sacrifice of the translucency which is so indispensable in what is, after all, only translucent mosaic painting.

Delight in shadow seems to be partly a national characteristic. Certainly it was developed in the Netherlands at a period when elsewhere there was a much stronger feeling for colour, and it was there, of course, that the school of chiaroscurists *par excellence* arose. Glass-painting of the sixteenth century is inevitably pictorial; but there are pictures and pictures, glories of colour, and marvels of light and shade. It is only in proportion as the painters' ideal is one of colour that it is capable of realisation in glass,—and by colour is meant not colour in the subtle sense of, for example, a Reynolds (who failed very conspicuously at New College), but in the sense of the early Florentine and Venetian painters; of the men so much in love with colour that they hesitate to sacrifice anything of its beauty for the sake of qualities, equally beautiful may be, but less dear to them. We find, accordingly, in France a quantity of early sixteenth-century glass, quite pictorial in its aim and yet not going far beyond what may be done, and well done, in the material. It is inferior to such works as that at Brussels only in largeness of design and strength of execution; in colour, which is of most account, it is sometimes superior. Indeed, it affords, on the whole, a type of old work most fit for our guidance in pictorial glass of modest aim and moderate dimensions. Its pictures are always decorative in design and glowing with jewel-like brilliancy of colour, not obscured by heavy painting, but modelled often with a delicacy reminding one rather of sculpture in very low relief than of the pronounced light and shade of pictures, which pretend to be "real" in proportion as they are lacking in the qualities most beautiful in art.

It is by no means only in coloured pictures that this quality of delicate, and as I think adequate, modelling is observed. One meets with windows in grisaille (there are some beautiful specimens at Chalons-sur-Marne) which fulfil in transparency exactly the part of sculptured bas-reliefs on a wall. I have a vivid recollection also of some medallion heads, in one of the châteaux on the Loire, painted very thinly on ordinary sheet glass, which reminded me more of some of Holbein's tinted drawings than of anything that I know of in glass. Here, if you like, is something on which we might found a treatment of domestic window panes.

The later Swiss glass, heraldic or what not, is, in like manner, most suggestive, although it is usually on too finikin a scale, even for the purpose to which it is applied. But nowhere can we learn better what can be done in the way of delicate manipulation and finish in glass-painting, than from those same medallions and heraldic panels, to be found in nearly every Continental museum of any importance. There are some superb specimens in the museum at Lucerne. The Swiss colour, however, is inclined to be crude, even where enamel has not been resorted to in order to evade the necessity of leading,—an evasion, by the way, which may be said to lie at the root of all evil in glass.

A beautiful feature in the best French glass, as seen, for instance, at Rouen, is in the grey-blue sky tint, on which is painted, with some minuteness and much delicacy, the background of the subject, architecture, landscape, or, it may be, the sea. This is going beyond what is necessary in glass, or, perhaps, desirable; but there is not much fear of its revival to any great extent. To be tolerable it must be done as it was done; that is to say, so well that only the designer himself could be the painter of the glass,—a practice much to be desired, but scarcely to be hoped for in these days; when the applied arts have practically no existence apart from commerce, and penny-wisdom rules that the artist's design shall be executed by a cheaper, and presumably, therefore, inferior, artist. One thing we might learn from the old glass-painters is,—to treat our art as an art, and not as so much manufacture.

The Renaissance glass in Italy is much of it, of course, earlier in date than that of other countries, which goes far to account for its individual character. The art was never very largely cultivated there, for obvious reasons; and what there is is said to have been executed to a great extent in France and Germany; but the design is Italian, markedly so, reminding one far more of contemporary Italian paintings than of old glass elsewhere.

It must be obvious to any one, on the slightest reflection, how well fitted are the paintings of the Italian masters of the fifteenth century for reproduction in glass. The love of simple forms and pure, bright, beautiful colour evinced in them, can find more adequate expression than ever in the medium of glass,—so much so that one is almost tempted to marvel (until one calls to mind to what extent Italian churches were at the same time picture-galleries) that they did not more commonly adopt it.

The pictorial quality of Italian glass was more decorative than that of the French glass spoken of, partly no doubt because it was earlier,—and probably the happiest mean of all is found in it between the glass-like and the pictorial. This is a mental note that others have made before me. The first of modern glass-painters has drawn something of his inspiration at that source. Mr. Burne Jones, whose treatment of glass is as workmanlike as it is original, would doubtless confess some indebtedness to the teaching of certain old windows at Florence and elsewhere in Tuscany. There are hints, both as to treatment, colour, and design there which no other glass affords.

I said both as to treatment, colour, and design, and I may add that what was said of the inadequacy of any one historic type as our model in the treatment of glass holds good, and that even more emphatically, with regard to colour and design.

Because the early figure glass was mostly deep in colour, are we to have no figures in grisaille? Because the later glass was best when it was delicate and silvery in tone, are we to have no rich windows any more? Because the medallion subjects of the thirteenth century were diminutive in scale are we to have no larger pictures ever? Because the Cinquecento pictures were spread over the entire window, are we to give up all idea of framing smaller subjects in ornament? And as to that ornament, are we to choose, once and for all, between the forms of this or that period, between the formulas of design adopted in one or other of them?

It is very true that in times past the artist worked pretty much on clearly-defined lines, which can be traced very distinctly in his work, and mark the period of its execution. But there was a good deal in that that was mere fashion, only more respectable than the fashions of our own day because it was less ephemeral. Strip off all that unmeaning and unnecessary surplusage, and you will find that the naked principles underlying the work of the various periods are not nearly so dissimilar as they at first appeared. Once unveiled, they are, indeed, seen to be not only of one kind, but of one family, the later only a development, for better or for worse, of the earlier,—in certain directions, and up to a certain point, decidedly for the better, and from a certain point very much for the worse.

To follow the development of glass design would be to follow once again (and once too often) the well-worn course of the styles, which succeeded one another in glass much as they did in sculpture and the rest of the allied art which go to make up architecture,—only always a little in the rear of architecture. The essential thing is to note how the succeeding fashions of design fitted in with the conditions of glass-painting, what the art gained from them, and wherein they were misapplied,—in fact, their influence, good and bad, upon glass-painting.

The design of the glass has always depended more or less upon the shape of the window

opening. The proportions of the Norman round-arched windows, or of the Early Pointed lights, almost of itself suggested a good broad border to the glass. And it happens that in the Renaissance, again, when windows of somewhat similar shape occurred, a somewhat similar use of the broad border recurs also.

The Early notion of breaking the space within the border into medallion pictures, with intermediate mosaic of geometric or foliated ornament, is in direct pursuance of early Christian tradition. There is a painted ceiling in the Romanesque Michaelis Kirche at Hildesheim (there is a photograph of it here), which might have been used straight off as the design for an early window. And you see very much the same kind of thing in the little enamelled tryptichs of Byzantine workmanship. But the use of the medallion form is by no means confined to the first Gothic period; it survives in some shape or other to the very end of glass-painting. The cartouche of the Rococo is only a degraded medallion form.

With narrower lancet-lights came narrower borders, the medallions being sometimes allowed to cut over them. This constitutes a new departure in design, carried further in Decorated glass, in which it was sometimes quite a feature in the composition, as in the fourteenth-century windows at Freiburg. Our eyes once opened to the usefulness of a device of this kind, we cannot, in reason, shut them to the facilities it affords, whatever the style we adopt.

But even in the thirteenth century there were men to whom that was not liberty enough, and we have accordingly,—as, for example, at Augsberg,—groups of lancet-lights treated as one window, the medallions, of great size, extending across the three lights, giving all possible scope to the figure-painter. The result is effective enough; and an occasional break in the monotony of Early design is welcome. How far such a practice should be followed may be open to dispute. But I think it would be more than hard to deny the artist such a licence altogether.

This opens up the whole question as to the desirability or permissibility of transgressing in glass-design the limits of a single light. The glass-painter is bound to respect, and, in the main to follow, the form of the window-frame. But the architect,—assuming him to be, humanly speaking, faultless (*quod est*, in every individual case, *demonstrandum*),—is compelled sometimes, by reasons of construction or other equally imperative conditions, to adopt a window shape not just what he would have chosen had he had nothing to think of but the effect of his window from the inside. In such a case it is within the province of the glass-designer to bring it to something like the proportion he would have preferred. A broader or narrower border, for example, a horizontal division, or the introduction of any strongly-marked shape, will make all the difference in the apparent proportions of a window.

Already, in very early glass, the designers sometimes took upon themselves to contradict, so to speak, the window shape in the design of their glass; that is to say, they would divide a too-broad window into two, and treat the halves as separate lights with borders of their own, and perhaps the semblance of a quatrefoil or so by way of tracery in the window-head. (This occurs, I remember, at Bourges). Or again (as, for example, at Poitiers), they would include two lights in one design, with a border only on the outer side of each, the ornament or subjects enclosed extending across the two.

In the second Gothic period, when windows were divided into many tall and narrow lights, it was the almost invariable custom to cross the constructional lines of the window with the lines of the glass. This was, doubtless, with the full concurrence of the architect, who very likely reckoned upon some such filling to complete his windows. At all events, they seem to stand in need of that banded treatment adopted in Decorated glass, to hold the lights, as it were, together. The use of horizontal bands of subjects in colour across the window, alternating with bands of ornament in grisaille, proved a very satisfactory solution of the difficulty of treating a tall window of Decorated or Perpendicular type; and its use does not end with those types.

In the earlier instances each subject was completed within the width of the light, only its weight and colour connecting the one with the other. But it was only a short step from that to bridging over the space of two or more lights (or, perhaps, the whole window) with a canopy enclosing a single subject, so affording space for figures on a much larger scale than was any otherwise possible,—on a scale, in fact, as large as the lights allowed. The later Gothic glass-painter took just what space he wanted for his subject. In a five-light window, for example, he would, if it suited him, carry one subject through two lights and another through the remaining three, allowing himself equal licence as to the height of his subjects, a practice rather perplexing to the eye accustomed to some sort of symmetry in arrangement. We attach, perhaps, too much importance to symmetric composition in glass, which seems much more necessary on paper than in actual work. In my experience many a window which has attracted me by its interesting distribution of colour has proved to be devoid of symmetric balance, although I had never felt the want of it until I came to analyse the design.

Still the confusion which results from a recklessly haphazard distribution of subject is to be avoided. It is no uncommon thing in old windows for the sky which forms the background of our subject to get hopelessly mixed up with the sea in the front part of its neighbour; distant landscape is interwoven with foreground grass; and the meaning of it all is only to be unriddled by a painful effort, incompatible with pure enjoyment of the beautiful colour of it all.*

SEWAGE PURIFICATION.

SIR,—In attacking my paper as to sewage purification at Guildford, Dr. Thresh repeats his assertion that my results are diametrically opposed to those of all previous experimenters. But he carefully avoids any reference to the exact quantitative results obtained by Mr. G. M. Taylor, C.E., F.C.S., which have been published in various journals, and which were cited in the paper in question (*Builder*, vol. xlix., p. 887). Thus when, after the expression of general doubts as to which it is not necessary to discuss the details, he says that I have not adduced "a shadow of proof" as to the resolution and escape of the putrescible matter, he omits to say that he has before him a statement to that effect from a competent analyst, who is a member of an engineering firm second to none in authority as to matters connected with water supply and purification. I leave Dr. Thresh's doubts to be confronted with Mr. Taylor's definite statements.

The establishment of Government-paid chemists in every town, as proposed by Dr. Thresh, would no doubt be an excellent thing for the members of his profession. How far the result would be equally advantageous to the country it may be time enough to inquire when there seems any probability that such a step towards the endowment of science is about to be taken. As far as candour in treating any discovery that does not emanate from themselves is concerned, Dr. Thresh does not afford the most brilliant promise, as, in his letter to the *Manchester Guardian* of 1st December, he represented my dose of 100 grains of sulphate of iron in each gallon passing through my tank as being 100 grains in every gallon of sewage.

I must also add that unless Dr. Thresh has published something which I have not seen, his statement "I showed . . . that I had carefully repeated the experiments he described with several different samples of sewage," is incorrect. My first letter on the subject was published on October 1st. Dr. Thresh's criticism appeared on October 3. It contains not a word about repeating my experiments, for which, indeed, there would hardly have been time in the interval.

Allow me, without further comment, to reply to the four questions very pertinently put by Dr. Thresh.

"1. Does the process remove all the suspended matter in the sewage?"

Answer.—Yes. In the very strong domestic sewage on which, as being always almost perfectly identical in its strength, our main series of analyses has been conducted, the whole of the suspended matter, and 29 per cent. of the matter in solution, is removed by the process.

"2. Does it remove any considerable portion of the dissolved putrescent matter?"

Answer.—Yes. It removes it all.

"3. Does the sludge deposited permit of being readily removed, pressed, and dried; and what is its nominal value?"

Answer.—There is no sludge. The analysis of the precipitate gives 11·56 grains of mineral matter, and 15·84 grains of organic matter, precipitated from a gallon of sewage. This precipitate contains no slime, no lime, and no clay, and does not entangle water in the form of sludge. The costly procedures of pressing and drying, which form part of Dr. Thresh's "typically perfect process," are thus rendered unnecessary.

The manurial elements of potash and phosphoric acid are not removed by my process; and while the albumenoid ammonia is greatly reduced, the free ammonia is increased, so that any value present in the sewage is obtainable in a convenient form.

"4. Can the matter added to the sewage possibly be deleterious, if ever used slightly in excess of the actual requirements?"

Answer.—The only result of an overdose will be the deposit, as in the case of the purification of the water of the river Nethe at Antwerp, of a small quantity of oxide of iron, when the metal has fully performed its work of purification. The presence of a small portion of this substance is said, by the chemical text-books, to be advantageous to vegetation.

Fully agreeing with Dr. Thresh, that "in experimenting with sewage scientific method cannot safely be ignored," I enclose Mr. Taylor's analysis, which distinctly proves the above points, and remain, your obedient servant, FRANCIS R. CONDER, M.Inst.C.E.

P.S.—Dr. Thresh might, with advantage, have added a fifth query, viz.:—"Has it any effect on the main cause of diphtheria and typhoid fever, namely, sewer gas?"

Answer.—It destroys sewer gas in its nascent state.

* To be continued.

Illustrations.

LIVERPOOL CATHEDRAL.

DESIGN BY MR. W. EMERSON.

THE views, plan, and geometrical drawings of this design, given in the present number, are fully referred to and described in the article, and the quotations from Mr. Emerson's report, in another column.

DESIGNS FOR STAINED GLASS.

THESE designs, reproduced from drawings by Mr. Lewis F. Day, are introduced here in connexion with his paper on the subject read before the Architectural Association, and reported in another column. The paper being a very long one, however, we are unable to find space for the whole of it this week, and the special references to these plates occur near the end of the paper in the portion not yet published. The first of them illustrates an idea taken from marble wall panelling, the central panel of coloured marble being represented by a patch of red made up of flames and demons. The other illustrates the application of purely ornamental design to glass, without the introduction of figures.

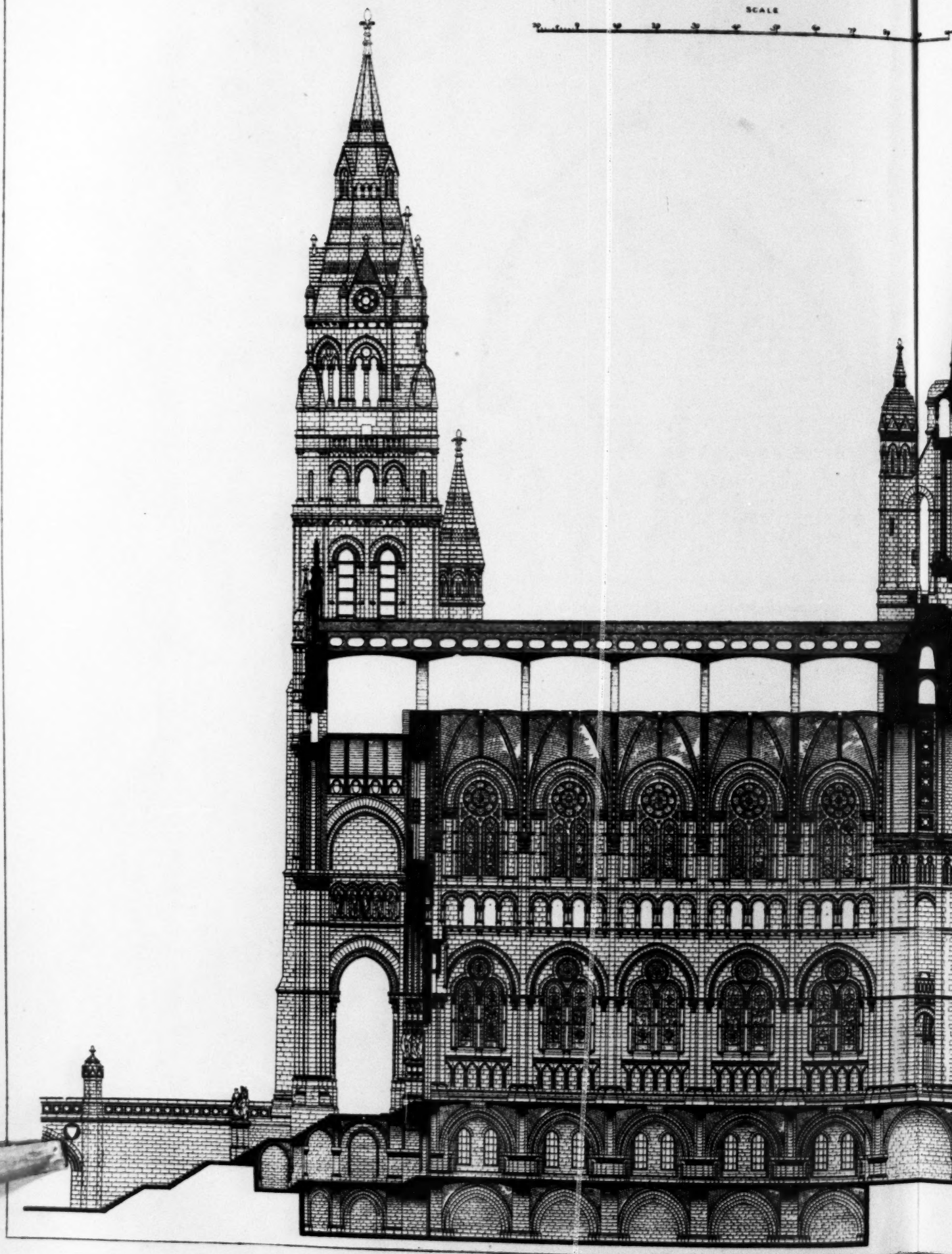
"What is a Bill of Quantities?"—In reference to a letter under this heading, in our issue of January 2, on which we commented at the time, it appears that we have unwittingly allowed an injustice to Mr. Cheers, the architect of the Slough Public Institute, which was the building for which the quantities referred to were made out. The quotations made by our correspondent, the "Suburban Builder," were correct as far as they went, but he did not notice that a sum was named in a separate portion of the bill of quantities for the terra-cotta details, and a price per cube foot given which would be accepted for the mason's work named in the general clause quoted by our correspondent. This is not exactly "taking out quantities," certainly, but it is quite a different thing from what was implied by the "Suburban Builder," that no further information had been given as to the work named in these general clauses. The woodwork always was given much more fully than was stated in his letter. The "Suburban Builder" does not seem to have looked at the quantities carefully enough before making his protest, which was at all events a good deal stronger than the circumstances called for. We had not an opportunity of seeing a copy of the "Bill" again till this week, or we should have referred to the matter before.

"INK PHOTO." SPRAGUE & Cº. LONDON.

DESIGN ILLUSTRATIVE OF MR. LEWIS DAY'S PAPER ON STAINED GLASS.

DESIGN FOR PROPOSED CATHEDRAL LIVERPOOL

SCALE



LIVERPOOL CATHEDRAL COMPETITION.—DESIGN

LONGITUDINAL SECTION, LOOKING

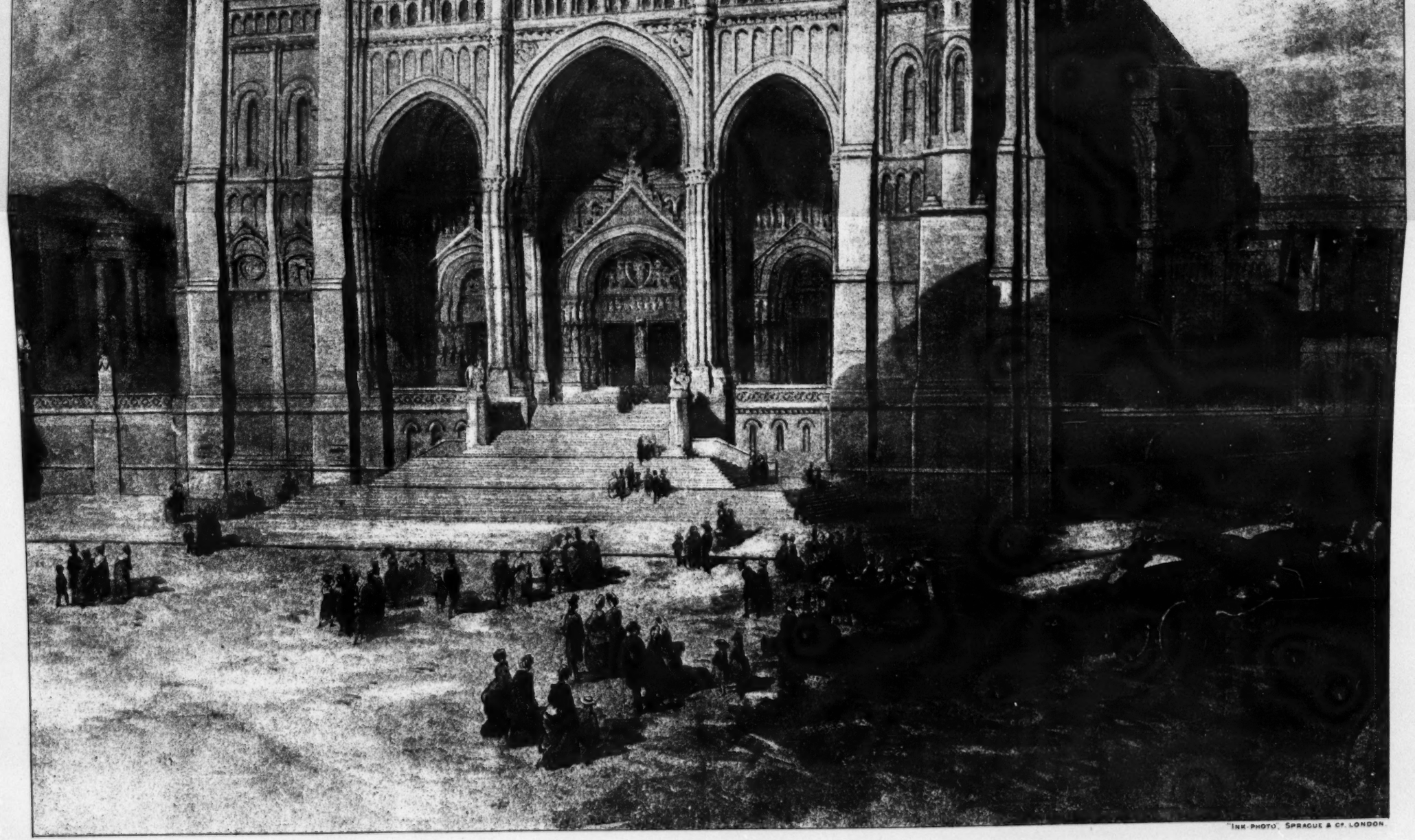
EDRAL
OL.

PHOTO LITHO SPRAGUE & Co LONDON

ON.—DESIGN BY MR. WM. EMERSON, F.R.I.B.A.
PERSPECTIVE VIEW FROM THE S.W.

ON.—DESIGN BY MR WM. EMERSON, F.R.I.B.A.

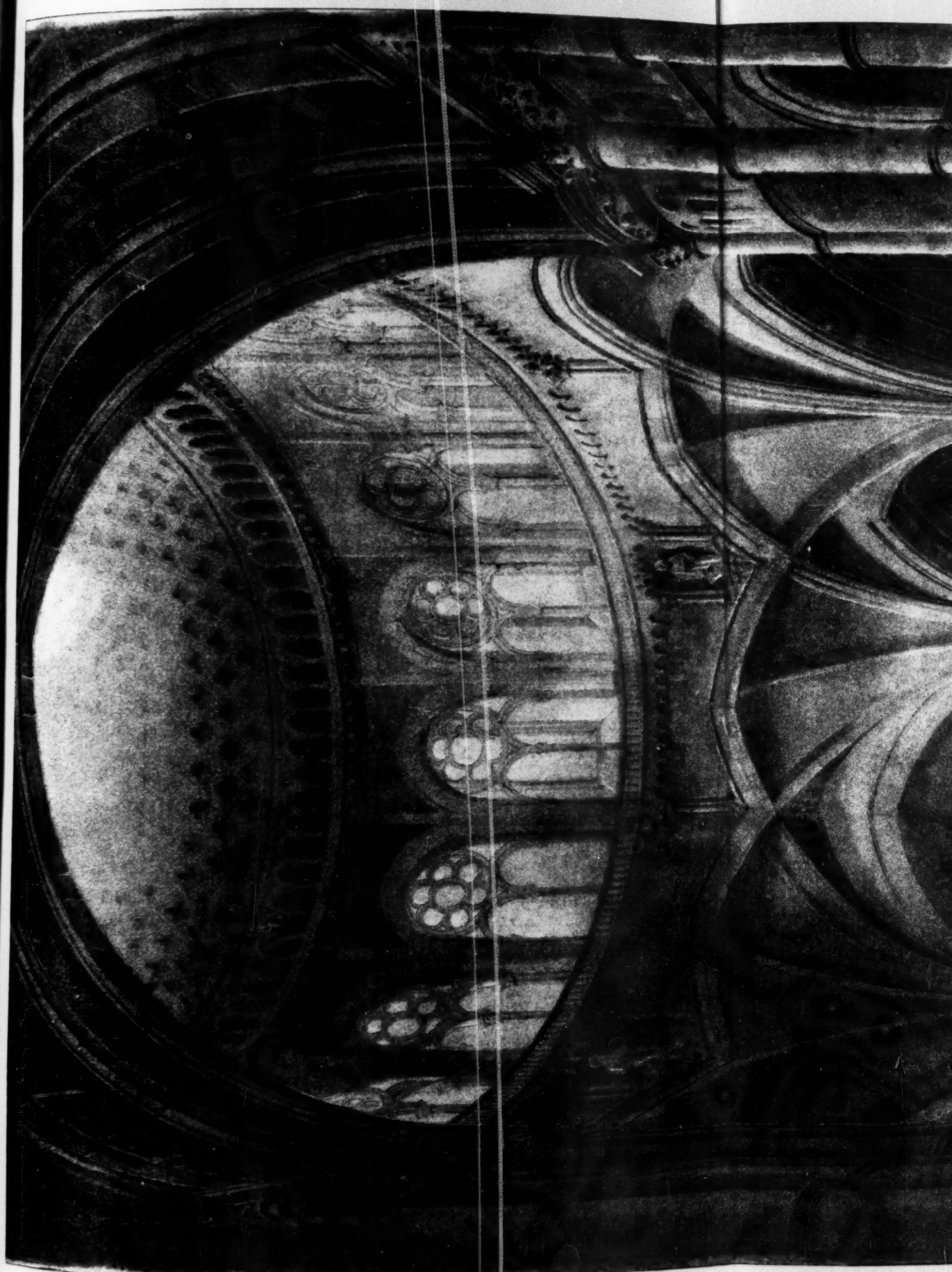
TION, LOOKING NORTH.

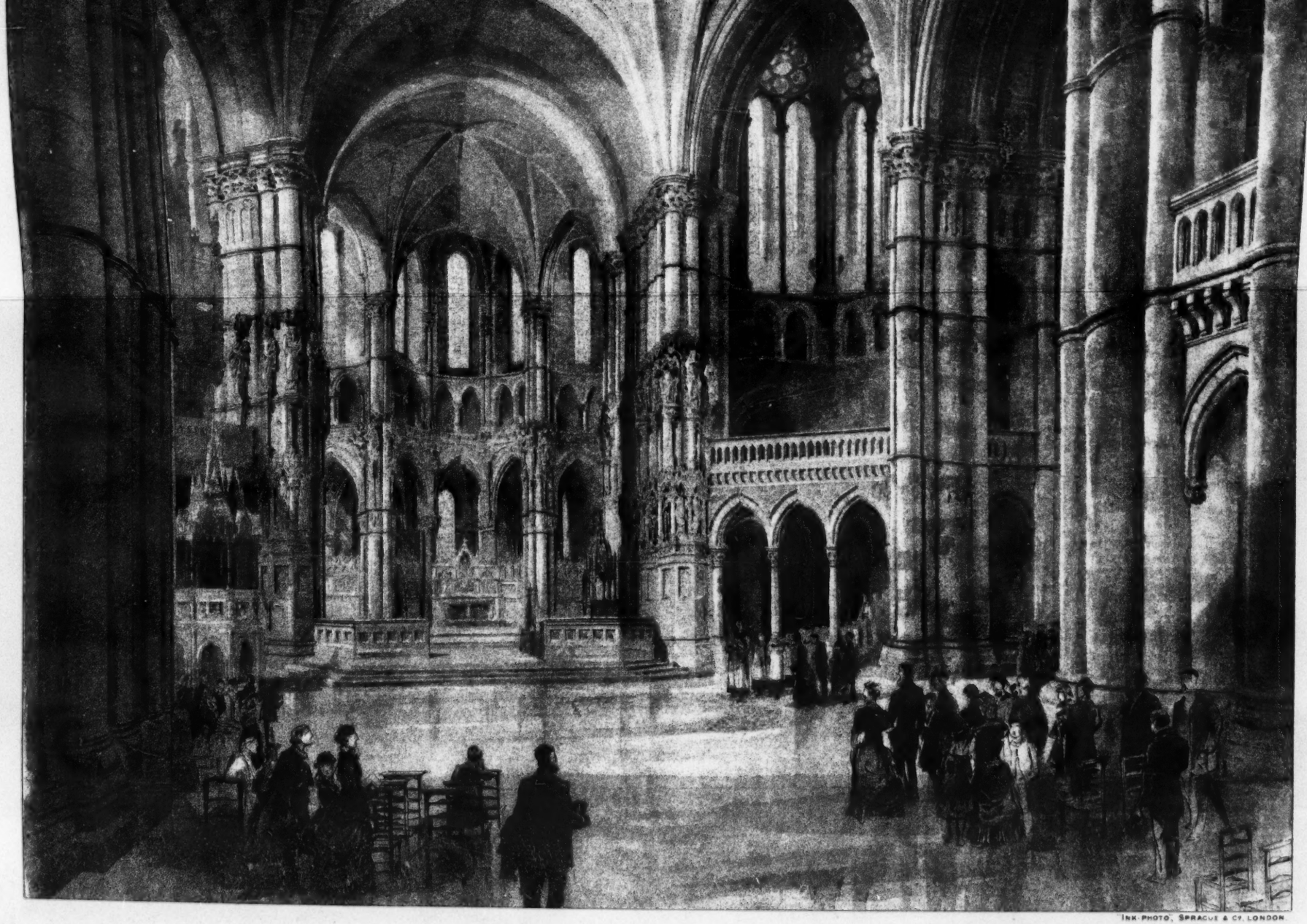


"INK-PHOTO" SPRAGUE & Co. LONDON.

LIVERPOOL CATHEDRAL COMPETITION.—Design by Mr. Wm. Emerson, F.R.I.B.A.

Perspective View from the S.W.





INK-PHOTO, SPRAGUE & Cº. LONDON.

LIVERPOOL CATHEDRAL COMPETITION.—Design by Mr. Wm. Emerson, F.R.I.B.A.

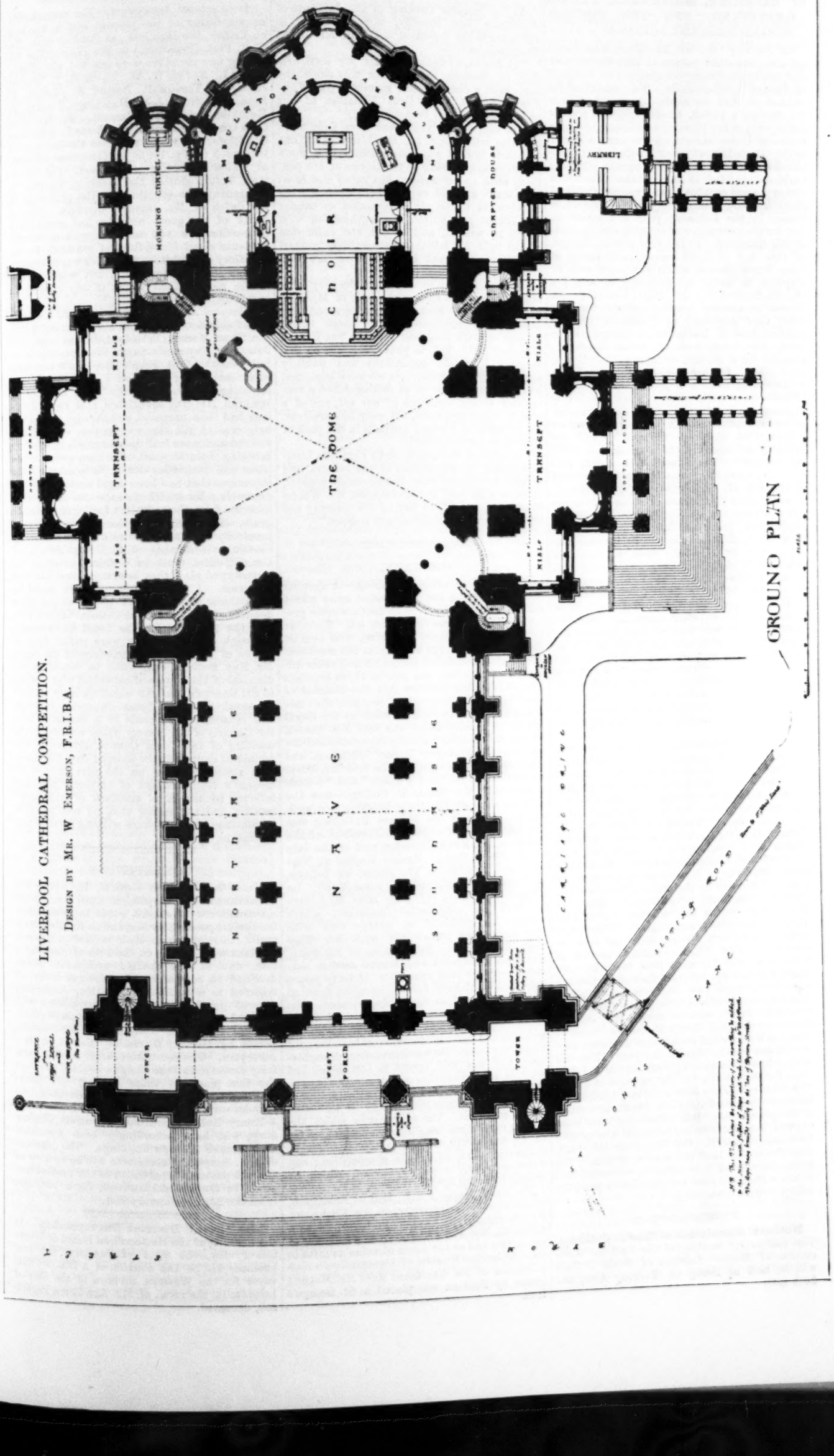
Interior View.

"INK PHOTO" SPRAGUE & Cº LONDON

DESIGN ILLUSTRATIVE OF MR. LEWIS DAY'S PAPER ON STAINED GLASS.

LIVERPOOL CATHEDRAL COMPETITION.

DESIGN BY MR. W EMERSON, F.R.I.B.A.



ST. SAVIOUR'S, SOUTHWARK, PARISH GRAVEYARD, AND THE DISUSED BURIAL GROUNDS ACT, 1884.

ON January 15th last Vice-Chancellor Bacon gave an important judgment upon the effect of this Act in preventing the erection of buildings on disused burial-grounds. We gather that by an Act of 1883 for abolishing church-rates in St. Saviour's parish, Southwark, the ancient graveyard; at the junction (north-east) of Redcross and Union streets, and otherwise known as the "Cross Bones"; was transferred from the parish wardens to trustees for certain parochial purposes specified in the statute. The ninth clause thereof enabled these trustees to sell and grant building leases of any land so vested in them. In the following year was passed an Act for the prevention of building over grounds of this character. In the fifth section, though, of this Act of 1884 exception is made of "any burial-ground which has been sold or disposed of under the authority of any Act of Parliament." In May last the St. Saviour's Rectory trustees offered for sale what they described as "valuable freehold building land in Union-street, Borough, occupying the large area of about 13,000 ft., adapted for a builder, contractor, timber-yard, &c." They further set forth that: "notwithstanding Section 3 of the Disused Burial Grounds Act, 1884, which renders it unlawful to erect any buildings upon any disused burial-ground except for certain purposes, the vendors believe that they are entitled to sell the property comprised in the particulars as building ground." They based their belief, presumably, upon the terms of the fifth section of the Act of 1884, which we have quoted. It would seem that Messrs. Thomas and George Oyler bought the land for 2,300*l*. But, having made their purchase for building purposes they felt unable to complete it, inasmuch as the Act of 1884 forbade them to build. A summons in chambers having been taken out by the vendors under the Vendor and Purchaser Act, 1874, the Chief Clerk adjudicated in their favour. The summons was adjourned into court. There, after arguments heard for either side, it was decided that whereas the parish Act of 1883 was not a sale or disposition within the exception of the Act of 1884 (clause 5), and whereas when the Act was passed in 1884 neither the trustees nor anybody else had power to build over this land, the purchasers were entitled to the objection they had taken. So the summons was dismissed with costs.

The ground in question,—marked by no headstones, neglected, and recently a builder's yard,—belonged formerly to the diocesan estate of Winchester see. It had been used as a place of interment for the unfortunate inmates of the Bankside stews that lay between Bear Garden and Clink Prison. Sir William Walworth, *temp.* Richard II., held the stews as lessee under the Bishop of Winchester, whose "inn" stood hard by, westwards of Montague Close. Shakspeare makes the Duke of Gloucester to allude to the grant of licences by the bishops, in upbraiding Cardinal Beaufort,—at that time Bishop of Winchester,—with the words: "Thou that giv'st whores indulgences to sin." "Winchester Goose," moreover, formed a vulgar term of reproach. The "Cross Bones" served as a burial-ground for more than three hundred years, but has not been so used since October 31st, 1853, when two interments took place, which were solemnised with all the formalities observable in the case of consecrated ground. It is on record that during the Great Plague as many as six hundred bodies were deposited here within one week. About the year 1708 the Bishop leased the ground, and this for the first time, for three lives, for the purposes of burial. The next lease bears date June 5th, 1820, being for three lives and sixty-one years, at a rental of 65*l*. per annum. But before the later lease expired the wardens enfranchised the ground for a sum of 3,338*l*. On November 8th, 1854, they leased the land for a term of years; the lessee transferred it to another, who converted it into a builder's yard and paid 50*l*. a year, the vestry thereto consenting.

National Association of Master Builders. The half-yearly meeting of the National Association of Master Builders of Great Britain will be held at Derby on Tuesday next, the 26th inst.

THE LATE MR. FERGUSSON.

AT the business meeting of the Institute of Architects last Monday, the President, in reference to the lamented death of Mr. James Fergusson, said:—

"It has once again become my sorrowful duty to announce to you from this chair the decease of a distinguished member, [past Vice-President, and Royal Gold Medallist of our corporate body, Mr. Fergusson.

Few men of our profession have done more valuable work than he, the historian of our art; and few, if any, have achieved a more world-wide reputation by the labour of the pen. Such men, unfortunately, are rare; and however much some of us may have differed from his views as to the art we practise, we cannot but honour and admire the enthusiasm with which he worked, and mourn the extinction of the light his labours were qualified to shed on subjects of great importance in art and archæology.

It is not for me to dilate on the very interesting career and numerous works of Mr. Fergusson; that has been done by others, and may hereafter be supplemented by those better acquainted with him than myself; but I think it is only right that, as your President on this occasion, I should mournfully and publicly acknowledge the great loss we have sustained by the passing away of so distinguished a contributor to the literature of our art, and of a man so highly esteemed, not only by ourselves, but by many of kindred pursuits in the path of literary and artistic work.

The Council thought it right that the Institute should be represented at the funeral, and several gentlemen were consequently present, together with both our secretaries, Mr. Waterhouse, and myself, to pay to his memory our last tribute of appreciation and respect."

OBITUARY.

The Late Mr. William B. Colling.—A member of the profession has just passed away whose abilities entitled him to have taken a more prominent position than fell to his lot. We refer to the late Mr. William B. Colling, who died on Sunday last at the age of 72, from the combined effects of an attack of bronchitis and other ailments. Mr. Colling was one of three brothers who all inherited more or less the abilities of their father. His younger brother, the late Wallis Colling, was clerk of works at the Royal Courts of Justice under the late Mr. Street, having in a similar capacity superintended the erection of Montague House, Whitehall, and other important works, for the late Mr. Burn. As the author of "Art Foliage" and "Gothic Ornaments," Mr. James K. Colling,—now the only survivor of the three brothers,—is well-known. In early life William B. Colling was the associate of the present President of the Institute, Mr. Ewan Christian, and of the late Sir G. Gilbert Scott. Having studied at Norwich and London, in the offices, we believe, of Brown and Habershon respectively, he entered the office of the late Mr. Burn in 1846 as confidential assistant, which position he continued to occupy first with Mr. Burn, and afterwards with Mr. Macvicar Anderson, up to the time of his death. Unbroken confidence and mutual esteem characterised this long connexion of forty years. Seldom indeed have faithful services been so ungrudgingly and so devotedly rendered. Mr. Colling's natural powers were of a high order, and such as, if backed by a greater amount of ambition and self-confidence, must have brought him to the front. He was an excellent draughtsman, and was well versed in the theory and practice of architecture and the cognate arts. His leisure was devoted to his favourite studies of music and languages, in both of which he was a proficient. The only works which Mr. Colling carried out from his own designs, as far as we are aware, were a memorial tower at Guernsey, which he won in competition; and "Hendrefoilau," a country house, which he erected in Wales for Mr. Dillwyn, M.P.

Mr. Joseph Mayer, F.S.A., died at Bebington, Cheshire, on Monday night, in his 83rd year. He was formerly in business in Liverpool as a goldsmith, and was well known as a collector of antiquities and as the donor of valuable gifts to the Corporation Museum of Liverpool. In consideration of his munificent gifts Mr. Mayer's statue by Fontana was placed in St. George's Hall.

ARCHITECTURAL SOCIETIES.

Architectural Association.—The seventh ordinary meeting of the present session was held on Friday, the 15th inst., at Conduit-street, Mr. C. R. Pink (President) in the chair. The following new members were selected, viz., Messrs. Percy L. Marks, W. G. Wallis, R. H. Fowler, Henry J. Treadwell, Harold A. Barnett, E. Stanley Walters, John Hutchings, Thomas W. Ketchlie, and Walter Tarrant. Mr. L. F. Day then read a paper entitled "Some Lessons from Old Glass," of which we print the first portion this week (see p. 156). A discussion followed, of which we defer our report. The Chairman, before closing the meeting, referred to the recent loss sustained by the profession in the death of Mr. James Fergusson. Not to speak of the great work he had carried out in architecture and archæology, architectural students owed him a debt of gratitude for the "History of Architecture." This was not merely a most valuable text-book, but was also one of the most critical works of any country on any branch of art.

Liverpool Architectural Society.—At the meeting of this Society held on Monday evening last, Mr. Thos. Mercer, President, in the chair, Mr. James M. Hay read a paper, illustrated by drawings, entitled "St. John's site,—its fitness for a great cathedral; design of a great cathedral,—its fitness for St. John's site." In his opening remarks Mr. Hay mentioned that these drawings had been prepared months ago, and he had only waited till the competition designs had arrived and were laid open to public view before bringing them forward. He then proceeded in terse and humorous terms to combat all the objections that had been urged against this site, expressing his belief that the real secret of it all arose from the prevalent feeling of the incongruity of placing a Gothic building in close proximity with a structure of such a severely Classic style as that of St. George's Hall. If the cathedral must be Gothic, and of an old stereotyped plan, then he sympathised with that objection. A Gothic building there would be an æsthetic blunder. The genius of the place demands that it should be Classic. Admit that, and the site becomes the finest in Liverpool, although the whole city were pulled down in search of a better. In the course of his paper, Mr. Hay made a suggestion in regard to the disposal of the proposed cathedral with respect to St. George's Hall, to which we have referred on another page. Some discussion followed, and reference was made to a memorial from the Council of the Society which was read at the meeting of the Town Council last week. The memorial expressed the opinion that the specimen sculpture panel on the east front of St. George's Hall was out of harmony with and inferior to the high standard of the architecture, and suggesting that no step be taken to continue the sculpture without further consideration.

COMPETITIONS.

The Great Northern Central Hospital.—The committee of this hospital, in April last, invited six architects to submit plans in competition for the proposed new hospital in the Holloway-road. In response to their invitation five sets of plans were sent in on the 18th of September last, one of the invited architects having declined to compete. The designs were all referred to a building committee, comprising several gentlemen specially acquainted with hospital arrangements and of members of the medical staff, who were assisted in technical points by Messrs. Hovenden, Heath, & Co., surveyors. The committee, after having carefully examined all the designs, decided to award the first place to those bearing the motto "Thought." Upon opening the envelope, the authors were found to be Messrs. Keith Young & Henry Hall, 17, Southampton-street, Bloomsbury, who have accordingly been appointed architects of the new buildings. The drawings of the competing architects will be on view at the out-patients department of the present hospital, in the Caledonian-road, for a fortnight from the 23rd of January inst.

The Vacant District Surveyorship.—At the meeting of the Metropolitan Board of Works this Friday, the 22nd of January, the first business will be the election of a District Surveyor for the Western Division of the City of London, in the room of Mr. Rawlinson Parkinson, deceased.

INSTITUTE OF BUILDERS.

THE second annual general meeting of the Institute of Builders was held at the offices, 31 and 32, Bedford-street, Strand, on Tuesday last, the following report being presented:—

"In submitting their second Report to the members of the Institute, the Council are pleased to be able to state that the arrangements contemplated at the time the last Report was presented have been carried out, and they have, in conjunction with the Builders' Accident Insurance, Limited, and the Central Association of Master Builders of London, secured the whole of the first floors of Nos. 31 and 32, Bedford-street, Strand. This has enabled the Council to throw open a Library and Reading-room, and they feel confident that the facilities thus afforded for mutual intercourse will cause a large increase of members, although the number to be admitted is limited.

An inquiry into the cause of the depression of trade and industry having been instituted by the Government, a copy of the questions propounded by the Royal Commission appointed to investigate the matter was forwarded to the Council, and such of the questions as applied to the building trade were very carefully considered by them, and replies sent in.*

The Council regret to announce the resignation of Mr. Leonard J. Maton, who for several years acted as secretary of the Builders' Society, and afterwards of the Institute, as he felt he was not able to undertake the secretarial duties on the removal of the Institute to the new building.

Under the Articles of Association the President (Mr. Stanley G. Bird), one of the vice-presidents (Mr. J. Howard Colls), the treasurer (Mr. George Plucknett, J.P.), one of the auditors (Mr. Geo. Burt, jun.), and four members of the Council (Mr. Wm. Brass, Mr. Edward Conder, Mr. Arthur C. Lucas, and Mr. Joseph Randall) retire, but are eligible for re-election.

The meeting then proceeded to the election of the officers, who, with the exception of the Council, were all re-elected; the members of the Council being Mr. R. Neill, jun. (Manchester), Mr. J. H. Trollope (London), Mr. Wm. Hill (Gosport), and Mr. Joseph Randall (Woolwich).

THE PROGRESS OF THE WORKING CLASSES IN THE LAST HALF-CENTURY.

THIS was the subject of an elaborate paper, read by Mr. Robert Giffen, LL.D., at the meeting of the Statistical Society on Tuesday evening last. In concluding his paper, Mr. Giffen said:—

When the increase of earnings from labour and capital is compared, it is found that the increase from capital is from 190 to 400 millions only, or about 100 per cent.; the increase from the "working" of the upper and middle classes is from 154 to 320 millions, or about 100 per cent.; and the increase of the income of the manual-labour classes is from 171 to 550 millions, or over 200 per cent. In amount the increase due to capital is about 210 millions; to labour of the upper and middle classes, 166 millions; and to labour of the manual-labour classes 379 millions,—a total increase of 755 millions. The general conclusion from all the facts is, that what has happened to the working classes in the last fifty years is not so much what may properly be called an improvement as a revolution of the most remarkable description. The new possibilities implied in the changes which in fifty years have substituted for millions of people in the United Kingdom who were constantly on the brink of starvation, and who suffered untold privations, new millions of artisans and fairly-well paid labourers, ought, indeed, to excite the hopes of philanthropists and public men. From being a dependent class without future and hope, the masses of working men have, in fact, got into a position from which they may effectually advance to almost any degree of civilisation. Every agency, political and other, should be made use of by themselves and others to promote and extend the improvement. But the working men have the game in their own hands. Education and thrift, which they can achieve for themselves, will, if necessary, do all that remains to be done. Whatever else can be done will be done all the more easily if education and thrift are practised. I am not now speaking theoretically. I know from experience, and from intimate acquaintance with working men themselves, using the words "working men" in a popular sense, what can be done on very small means. It will be a shame to English working men if they cannot, with comparatively ample means, raise themselves to the standard of education which Scotch peasants have long since been able to reach with what, until recent years, were very narrow means. In conclusion, let me point out that in the near future there is a very serious difficulty impending; the difficulty, in fact, is already upon us. Since I wrote two years ago prices have further declined, which would seem to give working men even a greater advantage than they had then. But this decline is due to causes, as I believe, which necessarily involve a fall in wages and profits. Wages and profits must to some extent be adjusted to the changed prices. Hence in the present paper the present time I have spoken of has been rather that of two years ago, when my former paper was written, than the actual present. If I were to take account of the most recent changes in prices, I should also have to take account of the most recent changes of wages, which are all in a state of transition. What I have to suggest to all concerned is that the fall of prices, considering the length to which it has gone, is a phenomenon which working men should carefully study in their own interest, and that they should be prepared to some extent for a reduction in money wages. What concerns them is not "money" wages, but "real" wages. It is quite possible that in a period when money wages are falling, along with all other money values, their real condition may improve, because the fall in money wages is less than the fall in the money prices of the principal commodities which they consume. It has been a great convenience in the present inquiry that prices at the end were obviously much the same as at the beginning, or rather less, so that there could be no question as to the change in money wages indicating a corresponding real improvement. But this very convenience helps to impress on my mind the conviction that we have entered on a period in which all comparisons of that sort are already extremely difficult. The question is not one which working men or any other class can avoid.

In the discussion which followed, Messrs. Harris, Jeans, Leone Levi, Benjamin Jones, David Chadwick, Stephen Bourne, Rowland Hamilton, and Major Craigie took part. The conclusions drawn by Mr. Giffen were contested in certain particulars.

Mr. Giffen, in the course of his reply, said that, as to rent and house accommodation being dearer than formerly, the evidence which he gave in his former paper on that point proved conclusively to him that, taking the country all over, the chief cause of the increased rent demanded had been the improvement in houses and in the accommodation they contained.

* See *Builder*, p. 63, *ante*.

THE CLEANSING AND VENTILATION OF SEWERS.

AT the meeting of the Metropolitan Board of Works this Friday, the 22nd inst., a report will be presented by the Special Purposes and Sanitary Committee, as to the cleansing and ventilating of sewers, recommending:—

1. That any old and defective, disused, or partially disused sewers which may remain in any part of the metropolis should be disconnected from the present sewerage system, cleansed, and filled up; and that, where necessary, pipe or other proper sewers should be substituted.

2. That stringent measures be taken by the Board, and by the Vestries and District Boards, (*a*), for preventing road-sweepings passing into sewers; (*b*), for preventing the discharge into sewers, from manufactories and other places, of improper substances, such as chemical refuse or trade filth, or of hot water or steam, so as to be the cause of nuisance.

3. That the most important requirement for keeping sewers in satisfactory condition is a supply of water sufficient in quantity to carry the sewage in suspension through the sewers.

4. That whenever the supply of water in sewers is insufficient for cleansing the sewers, effectual provision for cleansing such sewers should be adopted by flushing or other means.

5. That one of the most effectual methods of flushing would be by means of water simultaneously discharged into house drains, as such a simultaneous discharge would flush branch sewers, then local sewers, and finally main sewers; that such a method of flushing can be effectually carried out by householders flushing their house drains periodically and simultaneously at stated times; that a great number of householders would probably be willing to co-operate with the authorities in improving the condition of the sewers in their district in this way; and that it is desirable that the several Vestries and District Boards should intimate upon what days and at what hours householders should flush their drains.

6. That provision near the heads of branch sewers, for flushing such sewers from their commencement, is to be desired.

7. That the practice of flushing the courts, alleys, small streets, &c., in poor districts, in summer, is to be highly recommended as a desirable method of flushing sewers and improving the sanitary condition of the districts.

8. That next to effectual cleansing, one of the most important safeguards against nuisance and danger to health from sewers is the dilution of the gases therein by a constant and plentiful supply of fresh air to the sewers by means of effective ventilation.

9. That the ventilation of sewers in the metropolis, by means of ventilating shafts leading to gratings in the centre of roadways, has been the cause of complaint owing to the imperfect manner in which the system has been carried out, the ventilators being deficient both in size and number.

10. That the surface ventilators to the recently-constructed sewers have ordinarily been placed at a distance of from 50 to 60 yards apart, with air-openings in the gratings equal to 60 square inches; and that the number and size of many of the ventilators on other sewers in the metropolis should be increased.

11. That the amount of ventilation afforded by large special ventilating shafts is in no way commensurate with their cost, and that the adoption of such shafts, with or without fire heat, or the connexion of sewers with factory shafts, can only be adopted in very exceptional circumstances. Where shafts with fires are used, the sewer gases should be allowed to pass into such shafts over as well as through the fires, otherwise the amount of ventilation afforded will be very much limited.

12. That pipe ventilators of large section, and constructed with bends and without angles, can be used with great advantage in addition to, and not in substitution for, surface ventilators, wherever the consent of owners and occupiers can be obtained to such ventilators being affixed.

13. That the Committee are of opinion that the ventilation of the sewers of the metropolis may be improved by altering the construction of many of the surface ventilators as previously recommended, and by carrying up large pipe-ventilators at convenient points wherever practicable.

14. That the use of charcoal or other appliances for deodorising gases in sewer-ventilators is undesirable, as such appliances do much harm by obstructing ventilation, are costly and troublesome, and are quite unsuitable for general use over a large sewerage system.

15. That during the cold and wet seasons the arrangements suggested in the report for providing ventilation will be sufficient, as putrefaction proceeds so slowly at low temperatures, and when the sewage is diluted with large volumes of fresh water, that the foul matters pass from the sewers before material quantities of offensive gases are generated.

16. That during dry and hot weather the foregoing recommendations respecting the flushing and cleansing be carried out as far as practicable, especially in sewers having only a small flow of water.

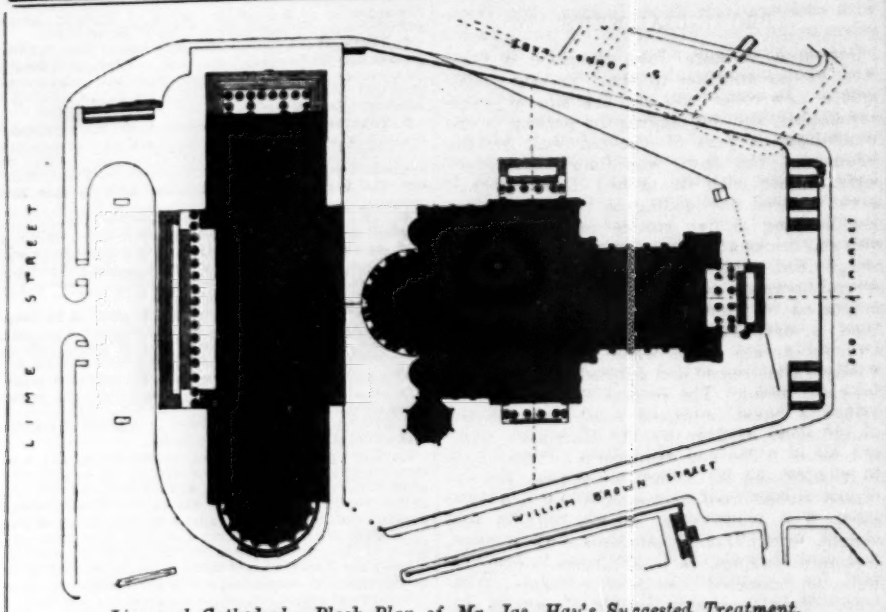
17. That in addition to these precautions, a system of deodorisation during the summer be arranged for the main sewers on the plan adopted by the Board during the past summer (see pages 23 and 24 of the report): that Local Boards be requested to adopt a similar system with local sewers, and to use all their influence to induce householders to employ in their house-drains suitable deodorising agents during periods of high temperature and drought.

18. That manufacturers and others discharging refuse into the sewers be compelled to so treat their waste water (by such process as they may deem fit, but to the Board's satisfaction), that it shall have no greater *deoxidising* power than average household sewage.

19. That the Committee are not prepared to recommend the Board to exercise the powers given by the 83rd section of the Metropolis Management Amendment Act for making by-laws for the guidance, direction, and control of the Vestries and District Boards, and other persons in relation to the maintenance, cleansing, ventilation, &c., of sewers, until it is shown that the suggestions made in the report have not been voluntarily adopted.

We may return to the subject next week.

Royal School of Mines.—Prof. Warington Smyth, F.R.S., in continuing his lectures upon mining, in the theatre of the Geological Museum, Jermyn-street, spoke at length upon the considerations necessary before venturing to reopen a mine after it has once been abandoned, and particularly the different systems in vogue of estimating the value of the workings. It is necessary that the lode should be tested at a great number of points, and no reliance placed upon the select few. Some of the most monstrous impostures brought before the country have been due to a lode having been tested at one or two convenient points, and then statements made on the assumption that the lode throughout would be of the same character. The correct course is to take fair and average samples of the lode from a great number of separate spots, build them up into a circular pile, cut it through by cross trenches, mix one of the quadrants obtained, and proceed as before, till we get a last sample for examination, which may reasonably be considered a fair average of the whole. Even in a slate-quarry, the blasting of a few pieces of rock, in which the cleavage seems perfect, is not sufficient to show the real value of the mass. Nothing but the actual working of it can do so. In the case of mineral deposits there is often a considerable cover of gossan, which renders superficial trials of little value, in which case preliminary operations soon merge into actual mining. The true character of a lode can only be obtained by running levels through a considerable length of ground, and frequently a depth of thirty or forty fathoms; sometimes sixty or eighty fathoms have to be reached before profitable returns may be expected, in which case it is evident that little can be done without sufficient capital and plant.



Liverpool Cathedral.—Block Plan of Mr. Jas. Hay's Suggested Treatment.

THE LIVERPOOL CATHEDRAL.

A NEW SUGGESTION.

At a meeting of the Liverpool Architectural Society on Monday evening last, elsewhere mentioned, Mr. James Hay read a paper in illustration of a design which he had made for a cathedral for the site now recommended. The accompanying is a block plan showing his proposal for the placing of the cathedral, with its main axis at right angles with that of St. George's Hall, and centrally with the latter building, so that the two buildings would form an architecturally-connected group, the cathedral being, of course, Classic in its architecture. We can say nothing of the design, which we have not seen, but this idea of the treatment of the plan is unquestionably a very fine one, and well worth consideration.

PROJECTIONS BEYOND THE BUILDING LINE.

GREENWICH DISTRICT BOARD OF WORKS *v.* HOILE.

At the Greenwich Police-court, Mr. Alfred Hoile, builder, of 40, Colfe-road, Forest Hill, was summoned before Mr. Marsham, at the instance of the Greenwich District Board of Works, for erecting certain buildings in Malpas-road, Brockley, beyond the general building line as defined by the Superintending Architect of the Metropolitan Board of Works. An order to demolish was asked.

Mr. Morton Smith, counsel for the Board, said the houses and shops were commenced in June last. A plan was deposited with the Greenwich Board, who thereupon obtained a certificate from Mr. Vulliamy fixing the building line. The defendant erected the houses as he had begun them, however, and there was no doubt they exceeded the building line.

Mr. Glen, who appeared for the defendant, raised an objection to the certificate of the Superintending Architect being put in without Mr. Vulliamy being put in the box.

Mr. Marsham, however, admitted the certificate.

After some formal evidence, Mr. Glen submitted, first, that the buildings having been roofed in at the date of the certificate no proceedings could be taken against the builder. They were completed, within the meaning of the Act, so far as the builder was concerned, and any proceedings must be against the owner or occupier. He further submitted that the Board were precluded from proceedings, because they had not, as required by the Act, given notice of objection within fifteen days after the defendant had deposited his plans. It was only after the completion of the building that his unfortunate client knew that he had transgressed.

Mr. Morton Smith said the defendant was warned in July by Mr. J. N. Smith, the Board's engineer, that if he built where he had placed his footings he would exceed the building line.

The defendant denied that any such conversation took place.

Mr. Glen, in continuation, submitted that, before adjudicating, his Worship must have proof that both parties were heard before the Superintending Architect. Another point was that the Superintending Architect had treated the land in question as vacant ground, whereas there was a School Board building previously upon it and projecting beyond the line of the buildings now complained of.

Mr. Vulliamy, who had been subpœnaed by the defence, stated that when he made the line of building, he was not made acquainted with the fact that there was any building on the land previously.

Mr. Smith said the school was a temporary iron building, for which a licence was granted by the Metropolitan Board of Works.

After hearing the evidence, Mr. Marsham said the only question seemed to be whether the Board ought to have given notice.

Mr. Smith contended that the 76th section of the Act 18 & 19 Vic., cap. 120,—the one under which it was directed that notice should be given by the District Board within fifteen days,—related only to drainage and the construction of drains.

Mr. Marsham, who had taken some time to consider his decision, and had viewed the *locus in quo*, said he had no doubt that the section related to the drains alone, and that it was not necessary for the District Board to give fourteen days' notice of objection. When the Act in question was passed, the whole matter of building lines was in the hands of the vestries, but now the Superintending Architect fixed the line, and the whole procedure was altered. He made an order for the demolition of the houses, with 5*l.* 5*s.* costs.

A case for a Superior Court, on the point of law as to notice by the District Board, was applied for and granted.

THE EXAMINATION IN ARCHITECTURE (INSTITUTE).

Sir,—Will you allow me to object very strongly to the letter from Mr. Arthur Cates published in last week's *Builder* [p. 143]? If there be one principle of administration more fixed than another with reference to official "exams.," it is that there shall be no private intercourse between examiners and examinees. Now, I understand Mr. Cates's letter to indicate, in the first place, that the exam. for the admission of Associates is something like a failure; and as he advertises himself to be "Chairman of the Board of Examiners" I am disposed to suggest that it may be very much his fault. I took an opportunity a fortnight ago, when sitting (on thorns) with the Council on the Charter inquiry, to challenge the policy of the examiners (which I referred to advisedly as the policy of Mr. Cates) in not publishing the past examination questions in the way that is customary; and I was supported by Professor Roger Smith, and, I think, Mr. Waterhouse, amongst others present. I fear our remonstrances must have made no impression, for within a few days out comes this letter. At the same time, at last Monday's quarterly election of members, not a single Associate was put up. Then, when I look into the new "Kalendar" of the Institute, I must confess that the programme of the work for the exam. completely takes my breath away. Nearly a hundred books are catalogued as representing *part* of the reading required, while the explanations further given appear to cover the work of a long lifetime. And all this for the test to be applied to a youth of one-and-twenty, to prove that he is up to the average of his compeers,—all that the Institute is entitled to require. Then, I am prompted to ask, by what official authority or permission Mr. Cates advertises himself as "Chairman of the Board of Examiners"? I do not see his name in the "Kalendar" in any such important capacity,—for important, and indeed all-important, such an office would be. If it were proposed to a general meeting to confer upon any person whatever that title formally, I, for one, should certainly object most earnestly. What would it mean? Nothing less than Grand Gatekeeper of the Guild! And most emphatically so if a personage with such a sounding appellation were to be allowed to whistle all the candidates to the feet of Gamaliel in the way now done. I know something about exams. by this time, and I happen besides to be the sole survivor of those by whom the "Voluntary Examination" of the Institute was organised many years ago, with a success which leads me to ask again and again (and I never get an answer) what has become of it. I may take leave, therefore, to advise the young men *not* to go to Mr. Cates, but to memorialise the Institute instead, and demand a proper understanding as to how far this exam. really is meant to go. Matters are in such a state at the Institute just now that I write this letter with not a little inclination to tremble; but I feel that we have all been keeping silence too long, and so I venture, if with many misgivings, to appeal to the *Builder*.

ROBERT KERR.

"PLUMBERS AND PARLIAMENT."

Sir,—The very sensible letter upon this subject in your issue of the 2nd inst. [p. 63], signed "C. A. M. B.," suggests that the Plumbers' Company, who are making laudable efforts to improve the technical knowledge of the members of the trade, should also endeavour to reform various anomalies now existing in the same.

I quite agree with the writer of this letter, but I venture to suggest that the question should be taken up by the builders themselves, who undoubtedly employ the largest number of men in this particular branch.

Where is the Central Association of Master-Builders, which, as representing the builders, should take up and deal with matters so important to its members?

It is well known to all who have much to do with plumbers that their class prejudices are very great, and that some of these are not to the interests of the community at large; for instance, it seems unreasonable that they should work different hours to *all other trades* employed upon a building, and this in the short winter days, when the use of artificial light is an absolute necessity; of course they do little or no work in this half-hour, but that only makes the danger and risk of fire the greater, and it is to be feared that plumbers are responsible for many losses in this way.

F. M.

Sir,—In reply to Mr. George Shaw's letter in your last issue, I beg to enclose a copy of a letter forwarded to him, and which up to the present has not been acknowledged.

The letter was posted on August 20th, 1885, and not having been returned by the Post-Office authorities, was, I presume, delivered by them in due in course of post.

Since I wrote the Worshipful Master, the offices of this Association have been removed to 31, Bedford-street, Strand, W.C.

E. S. HENSHAW,
Secretary of the Central Association of Master Builders of London.

[COPY.]

"Central Association of Master Builders of London,
27, King-street, Covent-garden, W.C.
London, 20th August, 1885.

Sir,—A statement delivered by you at a meeting of the Worshipful Company of Plumbers, held on he 29th June last, having recently been placed in my hands for perusal, I gather from a remark therein that the co-operation of other trades connected with house-building is sought. It occurs to me to suggest that at least one representative from this Association, and likewise from the National Association of Master Builders of Great Britain (Mr. W. Knox, 6, Lord-street, Liverpool, Secretary), might be asked to join your Council.

I think it would also be to the advantage of the Council to have a representative from the Institute of Builders; of this, Mr. L. J. Maton, 21, Cannon-street, E.C., is the Secretary.

I am, Sir, your obedient servant,
E. S. HENSHAW, Secretary.

To the Worshipful Master of the Plumbers' Company,
6, Lawrence Pountney-lane, E.C."

LIFTS AT No. 4, UPPER THAMES STREET.

Sir,—In reference to your notice of Messrs. Steven Bros.' new premises, No. 4, Upper Thames-street, E.C., in last week's issue [p. 142], Messrs. Steven Bros. authorise us to ask you to mention that we supplied, in addition to the hydraulic passenger lift mentioned in your notice, hydraulic goods lift and crane, all three being worked by pressure from the mains of the London Hydraulic Power Co.

Falmouth-road, S.E. R. WAYGOOD & Co.

"TWO DOOMED LONDON CHURCHES."

SIR,—I have been waiting for some other and better-informed person to correct an error in your issue for January 9th, in regard to the notice of the de-consecration of two out of the four of the London churches. You state that one of the four is "St. Thomas in the Liberty of the Rolls," and then proceed to give an account of "*The Rolls Chapel*," which is altogether another place. St. Thomas in the Liberty of the Rolls (and which is to be pulled down shortly) is a church built by the law stationers of Chancery-lane some fifty years or so ago (the Incumbent of which is a Mr. Moran), and is situated in Bream's-buildings, Chancery-lane, and is from every point of view a very different place in interest to the Rolls Chapel situated in Rolls-yard. I trust you will kindly insert some notice of this correction, as I dare say there are numerous other readers of your interesting paper who would share my very great regrets at any interference by the Goths and Vandals of this destructive age with such an edifice as the Chapel of the Rolls.

J. ALLEN ATKINSON,
The Grandson of one of the contributors to the building of "St. Thomas in the Liberty of the Rolls."

*** The mistake arose, not from want of knowledge of the facts, but from an oversight in revision and condensing of the article, and the omission of some portions of it.

THE SNOWSTORM AND THE VESTRIES.

SIR,—With reference to the above, both the vestries and their surveyors have recently experienced a fair amount of obloquy at the hands of a generally unthinking public. I do not for a moment wish to exonerate from blame those to whom it is due, but a consideration of the figures below will prove the unreasonableness of the complaints of many persons whose object in life is attained when they see their names in the local papers in connexion with a complaint. Indeed, many persons obtain a great deal of cheap popularity by this simple means, who otherwise would be unheard of and unknown. With regard to the recent snowstorm, the figures relating to the amounts to be dealt with, and the attendant expense, are simply appalling.

According to the figures given by Sir Joseph Bazalgette, when addressing the Institution of Civil Engineers as President, in 1878, the mileage of the metropolis streets exceeded 1,700, the width between the channels being 30 ft.; if we add 18 ft. for the footways, and allow for the increase since that date, the superficial area will certainly be not less than 54,000,000 square yards. My own observations proved that the recent fall was equal to a depth of 3 in. when compressed as carted, therefore the quantity to be dealt with amounted to no less than 4,500,000 cubic yards. Allowing for the distance to the available tips, it would be difficult for a cart to deal with more than 20 cubic yards per diem, thus 225,000 horses and carts and drivers would be required, costing, at 10s. per diem, 112,500*l.*, and 450,000 fillers and sweepers, costing, at 3s. 4d. a day, 75,000*l.*, if the snow were cleared in one day.

That it is impossible to do so must be at once conceded; indeed, it is exceedingly doubtful if all the snow could be cleared in twenty days, and it follows that carting can only be practised to a very limited extent, and that should be in the direction of freeing the principal thoroughfares, crossings, &c., from snow. In my district,—Wimbledon,—the quantities to be dealt with were only one-hundredth of the above, and although every man that offered his services was engaged at 4s. per diem, twenty was the maximum number available. What is really required is the cordial and hearty co-operation of all the occupiers. If the rather lax regulations were so framed that the obligation to free from snow the footways adjoining all premises within a reasonable time were compulsory as regards the occupier, and a penalty for non-compliance were not only provided, but means for its enforcement also, since the police courts are wholly inadequate to deal with the enormous number of cases that would at first assuredly arise, much good would result. The footways being clear, one gang should clear the snow from the channels to ensure the flow of all water resulting from a possible thaw, while another should clear the middle of the streets, the snow being thus heaped in parallel rows along the sides of the roadway. Extemporised snow-ploughs may with advantage be utilised for the street clearing. By these means the foot and road ways may be rapidly put in good condition for both vehicular and pedestrian traffic. Of course, the surveyor's efforts will be in the direction of the principal thoroughfares, and the amount of work he will perform will depend on the number of men and carts available; but, as regards the footways, there is no reason why all should not be quite free from snow within a few hours after the cessation of any fall.

WM. SANTO CRIMP,
Assoc.-M. Inst. C.E., F.G.S.

Wimbledon.

"Art Criticism" was the subject of a paper by Mr. G. C. Haité, read at the Richmond Athenæum last week.

PROVINCIAL NEWS.

Gateshead.—Messrs. John Davidson & Sons have, as an addition to their present mills, built a new roller mill on the site of some warehouses, and, on digging for putting in the foundations, a part of the old wall for the defence of the town was found in a very perfect state with its arched doorways and secret covered way leading to the river. The new building is five stories in height, built with red bricks and stone dressings, the interior being lined with white glazed bricks. The several floors are carried on rolled iron girders, supported on cast-iron columns, which rest upon a deep foundation of concrete and inverted arches. The whole of the interior woodwork is dressed and painted with Asbestos fire-proof paint. The several floors are filled with the latest improved machinery for the manufacture of flour by Mr. Harrison Carter, of London. The engine-house is 50 ft. long by 26 ft. wide and 30 ft. high, with open-timbered curved ribbed roof, surmounted by a lantern light. The walls are finished in Keene's cement with framed pitch-pine dado. Two horizontal engines, each 300 horse-power, are laid upon immense blocks of concrete, 12 ft. deep. They were supplied by Messrs. Wood, Bros., of Sowerby Bridge. The whole of the buildings are lighted with the electric light, by Messrs. Clark, Chapman, Parsons, & Co. The work has been carried out by Mr. Walter Scott from designs by Mr. Richard Cail. Messrs. Donkin & Nickol, engineers, supplied the ironwork, Mr. W. H. Wilson acting as clerk of the works.

Cheltenham.—The President and Council of Cheltenham College have commissioned R. L. Birelton, sculptor, to prepare a memorial tablet, with medallion portrait in white marble, of the late Rev. T. A. Southwood, M.A., to be placed in the chapel next to that of the late Major Pierson, by the same sculptor.

Calne.—A large clock has just been erected at the Town-hall. It strikes the hours, chimes the quarters, and shows time on one 5 ft. dial. There is automatic apparatus to turn the gas up and down. The work was carried out by John Smith & Sons, Midland Clock Works, Derby.

Oxford.—According to the *Oxford Chronicle* the fall of Osney Bridge has brought with it a series of complications, the solving of which, it is now almost certain, will take place in the law courts. The local board, at their last monthly meeting, accepted a tender from Mr. Charles Bossom, of Oxford, to erect for 477*l.* a temporary timber bridge over the River Thames, from Russell-street to East-street, Osney, according to plans prepared by Mr. W. H. White, M.Inst.C.E., Engineer to the Board. This work has been undertaken under an arrangement between the Board and the County Bridge Committee, the cost to be ultimately borne by whichever of the two bodies named is proved to have been chargeable with the maintenance of Osney Bridge. As it is probable the temporary bridge may have to stand a long time, it will be of a substantial character, and suitable for all traffic, except traction engines and the like. The supports in the river portion of the bridge will consist of three rows or "piers," each of six 12 in. square piles, varying in length from 18 ft. to 22 ft., driven 6 ft. into the river bed, each row to have two pairs of walings and strong diagonal braces.

CHURCH-BUILDING NEWS.

Stevenage (*Herts*). — Holy Trinity Church, Stevenage, has been enlarged. The church was built about twenty-five years, from Mr. A. W. Blomfield's design, and consisted of nave and chancel, Early Decorated in style. The additions comprise another nave and chancel on the south side, being about 16 ft. longer east and west, and joined to the original building by an arcade of three arches.

London.—For some months past important external works have been in progress at the ancient church of St. Giles, Cripplegate. The upper portion of the south frontage, containing the clearstory, was, until lately, faced with brick. This has now been replaced by Kentish rag-stone. As refaced, the clearstory is now surmounted by battlements. Portions of the south aisle frontage below, and the west end frontage of the north aisle, the stonework of which was found to be decaying, have also undergone restoration, as well as the old octagon tower at the south-east end, containing the staircase entrance to the galleries of the church, which were some time since altogether removed. The old tower consequently no longer serves any practical purpose, but it was, nevertheless, decided to retain it, refacing the brickwork of which it was constructed with Kentish rag-stone and battlements, uniform with the reconstructed clearstory. A new strong-room for the safe deposit of muniments and registers belonging to the church has been erected, adjoining the south-east entrance. Messrs. Dove Bros. have carried out the works, under the supervision of Mr. Edmund Woodthorpe, architect.

Kenn.—The parish church of St. Andrew, which Mr. H. Woodyer restored some time ago, possesses a particularly fine old rood-screen of carved oak, and of fifteenth-century date. A new rood, with sculptured figures of the suffering Christ, and of the Virgin and St. John, has recently been placed thereon. The cross has foliated ends, and is about 9 ft. high. It has been erected by Mr. Harry Hems, of Exeter.

Hebburn-on-Tyne.—Funds are being raised for the erection of the new Church of St. John the Evangelist. The late Mr. Ralph Carr-Ellison, J.P., of Dunston-hill, Whickham, and of Hedgeley, promised 1,000*l.* towards this church. To assist in the work, Mr. John Ralph Carr-Ellison, J.P., has offered a site at Hebburn Hall of more than half an acre, in part walled in and drained, and a long wing of a substantial building thereon for conversion into the new church. Hebburn Hall is situated in the new parish, and it is a building of great antiquity, and of archæological and historical interest. The Committee have gratefully accepted Mr. Ellison's assistance. The plans of the Church are prepared to seat 580 persons, and they are designed by the architect, Mr. F. R. Wilson, of Alnwick, author of "The Churches of Lindisfarne," in the Geometric Decorated style.

Southport.—The new Church of St. Philip, Southport, will be opened by the Bishop of Liverpool next week, its consecration being deferred for a period. The structure, which is situated in Scarisbrick New-road, is built in the style known as Geometrical Gothic, of Early English type, and comprises nave, north and south aisles, chancel, transepts, clergy and choir vestries, and organ-chamber, and will afford accommodation for 800 worshippers. The architect is Mr. R. H. Tolson, of Manchester, the contractors being Messrs. William Brown & Sons, of Salford.

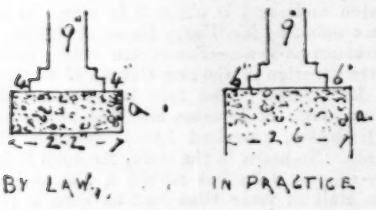
Ainstable.—The new chancel-screen which has been provided for this church is of oak, and is divided into five bays, the centre one being fitted with polished brass gates. The lower portions of the sides of the screen consist of cusped arches, supported by small columns, surmounted by circles containing carved sexfoils and traceried mouldings. Springing from the floor, and dividing the lower panels into bays, are buttresses and trefoil columns, which support the crocketed gables. At the intersections are placed figures of two of the Evangelists, above which are canopied pinnacles, each gable being filled by a bold arch, with cusps and carved spandrels, and the apex with a cinquefoil, surmounted by figures of angels. Immediately above the richly-carved centre arch is a niche containing a figure of St. Michael, the patron saint of the church, and this again is surmounted by an elaborate cross. At the sides of the centre gable are figures of the two other Evangelists, under crocketed and gabled canopies, above which are figures of angels on carved pedestals. The work has been executed by Messrs. Jones & Willis, of London and Birmingham.

The New Street from Piccadilly Circus to New Oxford-street.—The Works and General Purposes Committee of the Metropolitan Board of Works have resolved to recommend to the Board that the new street above indicated be named "Piccadilly-road"! If this absurd appellation be adopted it will be productive of great inconvenience. The same Committee have decided to recommend the Board to grant a site for a bronze statue to the late Lord Shaftesbury ("subject to the design of the pedestal and statue being approved by the Board") "at the circus west of Dudley-street which has been lately formed at the junction of the new thoroughfare from Piccadilly-circus to New Oxford-street with the proposed new street from Charing Cross to Tottenham-court-road."

The Student's Column.

FOUNDATIONS.—IV.

BY the by-laws in force in the metropolis (under the Act of 1878) *concrete in the trench* is required to be, at least, of the thickness of 9 in., and to project 4 in. beyond the footings in each side, unless the subsoil is a natural bed of gravel, where none is required. For a foundation on soft made-ground or on boggy soil this is inadequate; but it is the most that it has been thought right to fix as a minimum requirement. In the case of a 9-in. wall, with proper footings, the concrete will measure 26 in. in breadth, or very nearly three times the thickness of the wall,—an enormous advantage, certainly. In general practice the concrete is made



to project 6 in. beyond the footings, and the depth is regulated by the nature of the soil. When the bottom of the trench is considered to be sufficiently sound (a matter to be judged of, as has been said, by the light of experience, which cannot be acquired too soon), the question whether the concrete shall be carried up to a greater or less height must depend mainly on the relative cost of concrete and brickwork of their respective widths. In the common case of a wall one brick and a half in thickness, the area of the bottom of the concrete will be nearly three times the area of the wall, and piers of 1 ft. 6 in. and 2 ft. 3 in. will stand on ground of about seven times and five times their respective areas.

It is important to see that the bottom of the trench is as clean as possible, being free from any soft mud that may have been allowed to fall into it, and particularly from mud formed by water having been allowed to stand in the trench. When it is evident that water will rise in the trench as soon as the concrete has been deposited, the lime used should be blue lias rather than any ordinary kind, which is not capable of setting under water. Pumping should be kept up so as to keep the water below the level of the concrete until it is deposited in the trench, but not so as to draw away the water through the freshly-deposited material which would remove a large proportion of the lime. If it is necessary to deposit the concrete under water, more care is required to use good hydraulic lime, to mix the concrete with less water, and to drop it quietly into its place.

The application of concrete where the subsoil is of irregular composition, and the mode of using it in underpinning, remain to be considered.

Soils of Irregular Composition.—Referring to preceding observations on the virgin soil and on made-ground, it will be seen that the soil in different parts of the same site may vary considerably, so that the artificial foundations that might be suitable for one part of a building may be insufficient in depth or in breadth, or may even be unsuitable in kind for another part. We have, therefore, to contend with this difficulty in addition to that which might be caused by the nature of either of the soils if it extended over the whole site. Made-ground whether, as a whole, soft or hard is generally of irregular composition. On such a soil it is best to increase the amount of concrete both in its breadth and in its thickness, so that weak parts of the soil may be bridged over and the effect of any sudden transition from one kind of soil to another may be spread, and also extended along a considerable length of trench.

On an old site it is very common to meet with wells, or cesspools, or holes out of which clay or gravel has been dug. When these occur along the course of a trench they are sometimes filled up with concrete which, if the hole is narrow and deep, is wasteful and may be mischievous. For if the general foundation is compressed to the slightest extent by the weight of the building, it is not merely useless to make a small portion of it unusually firm, but that portion may cause fracture in the wall by refusing to yield to the same extent as the rest. Such holes may be filled with hard rubbish, and the concrete may be run over them, a relieving arch being thrown over the spot in the brickwork above the footings as a precautionary measure. Wider holes into which it is necessary to carry down the concrete should (unless they are very shallow) have the transition from the shallow to the deep foundation made by steps. If old walls are met with, or the large boulders that sometimes occur in ordinary soils, or if the point of a rock sticks up through a soil that may be expected to subside somewhat, it will be a question whether the obstacle is one that can be easily removed or whether it is better to throw an arch over it. By so doing, the building will be made to rest entirely on the yielding foundations, for which provision has been made.

Where part of a wall has to be built upon rock, and there is an abrupt transition to some soft stratum, the trench should be carried down through this stratum if by that means concrete can be laid upon a harder bottom, or upon a deeper part of the rock. When it is necessary to continue the wall upon the softer stratum without such deep foundation, concrete of extra width and thickness is required, but if the building is of considerable weight fracture of the wall is very likely to occur over the place where the foundation passes from the rock to clay or even to gravel. It is much better that an abrupt change such as this should happen under an opening in the wall, and the wider the opening is the less will be the danger to the building through differences in the amount of settlements. Where the opening is very wide, as in a bridge, there may be no ill effect from such difference in foundations; whereas, if it should happen under a pier the structure might be very seriously damaged.

In the sketch section, on page 65, a bed of peat is shown to "thin out" gradually so as to lie like a wedge upon a bed of gravel. It is very common to find an instance of a soft bed of clay silt or made-ground getting rapidly thinner as the ground beneath it rises. A heavy building placed on such a stratum will heel over, whether it has concrete below it or not, owing to the greater amount of compression of the soft bed on the side where it is thickest. A similar result may be experienced from a bed which is of uniform thickness becoming softer (as it is very likely to be) on that side of a building which is nearest to a stream. From one of these causes or the other a very large proportion of the most important buildings that stand on these soft foundations in the lower parts of England, Holland, and Italy, show a distinct and, to those who see them for the first time, an alarming deviation from the perpendicular. But when the extreme amount of compression has been effected, the subsidence is stopped; and, if it has not gone so far as to lead to the serious injury of the building, there may be no further danger. The best known instance of this is the Leaning Tower of Pisa, which was begun in 1174, and not completed till 1350. As it rose it began to lean over, and as each new story was added an attempt was made to build it upright. The limit of this one-sided subsidence was not reached till some time after the eighth and last story was put on. It overhangs its base 13 ft. in a height of 179 ft., and has probably long been stationary. The worst of the two Leaning Towers of Bologna, built early in the twelfth century, overhangs 8 ft. 6 in. Dante, in the "Inferno," written 200 years afterwards, makes use of the fearful appearance of this tower to one who stands under it in describing the effect produced in his mind by the vision of a giant that stooped over him. In the sixteenth or seventeenth century Guido painted these towers looking very much as they look now. At Dortrecht and at Delft, and in the neighbourhood of Venice, the towers lean very perceptibly, but the movement seems to have been arrested long since. The tall factory chimneys that stand on any of these treacherous foundations usually lean over, and it is sometimes necessary to cut out some of the lower courses on one side in order to restore them to the upright. The prevalence of strong winds from one quarter may bring about this result by throwing extra stress upon the soil on one side of such a structure.

Books.

How to Select Property before Purchasing, and How to Ascertain its Correct Value. By JOSEPH HENRY MCGOVERN. Liverpool: Gilbert G. Walmsley.

THIS work is little more than an expansion of a section of a well-known surveyors' handbook. As it is possible by dilution to obtain a gallon of soup from a cubic inch of the compressed article, so, out of a few pages of Hurst, with a seasoning of Banister Fletcher, it is possible to make a volume of McGovern. There is, perhaps, no harm in this. The nutriment is there, and, to some mental constitutions, the concentrated form is not the most convenient or wholesome. It is recorded of a certain Government clerk that he had the art of making a *précis* of a given subject longer than the original documents. The author of this work runs him very close, for he almost succeeds in making the headings of his chapters as long as the chapters themselves, allowing for difference of type. The professed object of the book is to show an unbelieving public that a surveyor's valuations have a "mathematical basis" and are not arrived at by "rule of thumb"; that they are the result of a careful weighing of the conditions of each problem in detail and not mere guess-work. The author, accordingly, exhibits the processes by which, in given instances, his results are obtained. There is nothing new in the system pursued, but we are glad to note that he has the courage to put the deductions collectively at something like the real proportion they bear to the rack rent, a point in which a too sanguine view of the subject often invalidates otherwise careful calculations.

When Mr. Mark Twain sent a portrait, drawn and engraved by himself, to his late Holiness Pope Pius IX., the Cardinal Secretary assured the artist in a courteous note of thanks, that "there was *nothing like it* in the Vatican," and the compliment was duly printed amongst other equally flattering testimonials. The land steward of the Earl of Derby was presented with a copy of a previous work by Mr. McGovern, and, while opining that it contained valuable information, admitted frankly that he had "*not read it*," and this is also duly chronicled by the gratified author. "These be fine humours!"

Houses and Building Societies: How to buy and how to sell, and how to manage Property well. By the Author of "Secrets of Success," &c. London: Simpkin, Marshall, & Co.

THE name of the author of this little work transpires in the reading of it, and an advertisement at the close thereof announces him the manager of a prosperous Building Society. It is not surprising, therefore, that the book in question sets forth the merits of these societies,—and we would be the last to underrate them,—with an intimate knowledge of their working and a desire that their many virtues should be better known. The little volume is in part original matter, and in a larger measure a repetition of the speeches and writings of others. Nothing that can be said for building societies is omitted, whilst such little drawbacks as may attach to them in common with every other human institution, are kept out of prominence.

It is doubtful whether the author's object will be assisted by adducing as evidences of the beneficial working of "an old-established society," instances of such a very unusual character as some of those quoted by him.

W. A. bought a property which brought in a *net* rental (after making the usual deduction) of 54*l.* per annum, for 305*l.* W. A. was very fortunate, but if M. or N. expects to go and do likewise we fear he will be kept waiting.

W. E. obtained property worth 320*l.* for 220*l.* and P. P. S., D. F., &c., were almost equally lucky.

We submit that for practical purposes it should be shown how property may be profitably acquired at the normal rates through the agency of a Building Society, and that these "sporting" achievements tend to demoralise rather than improve the character of the thrifty souls who are the main support of such societies.

We should hardly have expected to meet in such a book with the antiquated fallacy that if you open the lower sash of a window the air will come in, but if you open the top sash the heated air will go out. Try it.

The Suburban Cottage: its Design and Construction. By W. B. TUTHILL, A.M. New York: William T. Comstock.

WE have much pleasure in directing attention to this book, which is nearly all that a book of the kind ought to be. The author is quite master of his subject, and gives the world the benefit of his knowledge in a concise, lucid, and unaffected manner. After setting out the desiderata of an American suburban villa to cost 1,500*l.* or 1,600*l.*, he takes the reader carefully and frankly through the whole process of planning, design, and construction, beginning with the preliminary sketches, and completing a scheme, only to compress and cut it down afterwards, as usual, alas! to the prescribed figure. The arrangement of the several apartments, &c., is an American, and not an English one, it is true; but there are points about the plan which strike us as of doubtful propriety anywhere. In the first sketch for the house the pantry is without external light, and is wedged between a water-closet, a kitchen, and a laundry. It would be difficult to persuade us that this is quite right. In the reduced, and in some respects improved plans, the position of this apartment is amended somewhat, but now the kitchen has no less than six doors (it had four in the first sketch), to which we must demur. There may, of course, be "exquisite reasons" for this, although we cannot imagine them. It is a critic's business to criticise, but with this preliminary grumble our occupation is gone; for, with the exception of the questionable recommendation that all joints in lead pipes should be "wiped" as has hitherto been the practice, we have really no difference with the author. There is much in his book which may be usefully noted by English architects, and while English authors may imitate with advantage his clear and perspicuous style, English publishers may take some useful hints from the attractive manner in which American books are presented to the reading public.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

13,636, Window Sash Fastener. F. Howcroft.

A bracket on the upper sash carries a hook which works on a pivot in such a manner that the point projects when the window is closed and prevents the lower sash rising. To open the window the hook is pressed back, but a stop prevents it from going too far.

14,393, Asphalt Pavements. J. Stansfield.

The top layer is made of comparatively fine stone chippings, sand, &c., mixed with tar or pitch and creosote or other oil, and is well rolled. The surface is then painted with a mixture of mineral or rock pitch, or both, creosote oil, and finely-powdered chalk or spent gas-lime, or the like, the consistency of this varnish being varied according to the size of the stone to be employed for the final dressing. The varnished surface is entirely covered with stone or other material chosen so as to give any colour desired, larger sizes of stone, if employed, being placed by hand, and the interstices filled with smaller sizes, and is well rolled in order to imbed the dressing in the varnish, any excess of stones being swept off.

16,734, Slates, Tablets, &c. J. Willoughby.

Sheets of iron or steel are made suitable for writing upon by oxidising the surface. The sheets are placed in a furnace, and while at a high temperature are subjected to the action of superheated steam or air.

15,976, Fireplaces. E. R. Hollands.

In grates where the burning fuel is lifted by a rake passing between the bottom bars and fresh fuel fed beneath it, the bottom front bar is replaced by a frame with a horizontal flange round the inside, forming a tray. The frame is supported by a pivot at each end, about which it may swing, in order to close the aperture through which the fresh fuel is fed into the grate. It is retained in the close position by a weighted finger, which swings beneath it as it is lifted, and which, being removed by the poker, allows it to fall into its former position.

15,161, Embossing Canvas. W. S. Morton.

For decorating walls, &c., the canvas, prepared by successive steeping in boiling water and size, is beaten into the pattern upon a mould plate of metal or the like, the deeper cavities in its back being filled with paper pulp, or similar material, and a paper backing pasted and beaten on, covered with sawdust, and pressed. The sawdust is then removed, and the mould placed upon a heated metal casing, again covered with sawdust, and pressed, and heated until the canvas is dry and ready for use.

NEW APPLICATIONS FOR PATENTS.

Jan. 8.—299, J. Revill, Electric Indicators for House Bells.—307, A. White, Lavatories.—346, C. Wells, Closed Fireplace.

Jan. 9.—364, J. Hyde, Sash Fasteners.—373, H. Copland and J. Gilmour, Formation and Construction of Harbours, Piers, and Breakwaters.—394, J. Stanley and J. Todd, Boilers for Heating Public Buildings, &c.—400, W. Madge and J. Penrose, Water-waste Preventer.—407, G. and S. Jennings and J. Morley, Flushing Cisterns.

Jan. 11.—411, B. Sutcliffe, Hand Planing and Thicknessing Machines.—432, A. Henderson, Sinks and Lavatories.—440, S. Jenner, Chimney-top or Ventilating Shaft.—441, J. Pullar, Apparatus for Opening and Closing Hinged or Pivoted Windows, Ventilators, &c.—447, H. Peters, Portland Cement.

Jan. 12.—488, W. Youlten, Butts of Hinges.—492, A. Boult, Locks.—494, A. de Boischevalier, Polishing Plate Glass, Marble, &c.—502, J. Jex Long, Open Firegrates.

Jan. 13.—517, J. and A. Bidwell, Cement.—521, J. Hicken, Automatic Door Opener.—522, J. Green and Others, Kitchen Ranges.—525, W. Morrison, Cooking Ranges.—538, R. Somers, Fireplaces.—547, H. Green, Door Bolts.—550, K. Weise, Pantile Roofing.—554, G. Bolton, Cowl and Ventilator.—560, J. Wragg, Fastener for Windows, Doors, and Shutters.—561, J. Stanley, Smoke-consuming Fireplaces.

Jan. 14.—587, T. Brattan, Hanger Attachments for Sliding Doors.—591, T. Bradford, Disinfecting Apparatus.—616, J. Howie, Drying Chambers.

PROVISIONAL SPECIFICATIONS ACCEPTED.

13,762, E. Hinkel, Locks.—13,788, G. Wyatt and W. Ballard, Hinged Sliding Sash.—13,821, W. White, Locks and Latches.—15,064, G. Porter, Hot-air Stoves.—15,108, J. Gilson, Cooking Ranges and Stoves.—15,309, E. Horsley, Window Fasteners.—15,364, E. Colton, Encaustic Tiles.—15,404, P. Sorel, Glazing.—9,588, E. Haynes, T. Ford, and J. Keatley, Fasteners for Window-sashes.—12,505, W. Allen, Self-flushing Water-closets.—14,525, J. Gordon, Syphon Drain Traps.—14,812, F. Trier, Machines for Cutting, Dressing, Turning, Planing, and Shaping Stone.—14,901, H. Rushbury, Door Locks.—15,007, W. Storey, Firegrates.—15,050, A. Coke, Electric Thief Detector.—15,519, H. Bonnycastle and T. Jones, Refractory and Non-conducting Bricks, Blocks, Tiles, Slabs, and Pipes.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

2,323, G. Oulton, Soldering Irons.—339, J. Lorrain, Heating, Cooling, and Ventilating.—3,130, J. E. & F. B. Rendle, Structures for Horticultural Purposes.—3,916, E. Ormerod and W. Horne, Cements.—8,748, A. Reddie, Rock Drills.—15,035, W. Scott Morton, Domestic Fireplaces.—15,252, P. Justice, Furnaces for Burning Limestone.—660, T. Clapham, Kitchen and other Firegrates.—2,233, H. Cleave, Lath Backing for Plaster Work.—3,299, N. Thompson, Connecting Lead and other Soft Metal Pipes, &c.—3,801, R. Keates, Dies for Ornamental Tiles, Bricks, Slabs, &c.—10,036, D. Doyen, Door Checks or Closers and Annunciators.—14,064, H. Mathey, Cement and Lime.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JAN. 12.

By DOWSETT & WOODS.

Cheapside—2, Laurence-lane, freehold, area 615 ft.	£4,210

By WATERER & SONS.

Weybridge — The residence, "Heathfield," and 3¼ acres, 67 years, ground-rent 28*l.* 10s.	4,200

By L. FARMER.

West Hampstead—12, 14, and 16, Birchington-road, 81 years, ground-rent 26*l.* 5s.	2,880

By BAYFIELD & HILL.

Commercial-road, E.—26 and 28, New-street, 21 years, ground-rent 7*l.*	495

JAN. 13.

By C. P. WHITELEY.

Stoke Newington-green—35, and "Howard" and "Warwick" Houses adjoining, copyhold	2,300

JAN. 14.

By NEWBON & HARDING.

Canonbury—25, St. Mary's-road, 59 years, ground-rent 10*l.*	950
Islington—202, Liverpool-road, 30 years, ground-rent 15*l.*	650
Kentish Town — 44 and 48, Rochester-road, 58 years, ground-rent 10*l.*	855
Haverstock-hill—1, Eton Villas, 62 years, ground-rent 3*l.*	600
Chalk Farm — 42, Gloucester-road, and studio, 58 years, ground-rent 7*l.*	520

A Social Evening at Tunbridge Wells.—On Saturday evening the *employés* of Messrs. Beale & Son, the well-known builders, &c., of Frant-road, were entertained at dinner, provided at the Swan Hotel, by the liberality of Mrs. and Miss Mills, in order to celebrate the completion of their new residence, "Cranwell House," Lower-green, by the firm. The house has been erected from the designs and under the superintendence of Mr. Herbert Caley, architect. Mr. L. S. Beale occupied the chair, and Mr. S. Beale the vice-chair, and a very pleasant evening was passed.

MEETINGS.

FRIDAY, JANUARY 22.

Metropolitan Board of Works.—Election of a District Surveyor for the Western Division of the City of London. 12 noon.

University College.—Professor C. T. Newton, C.B., on "Greek Inscriptions." II. 4 p.m.

MONDAY, JANUARY 25.

The Worshipful Company of Plumbers invite a meeting of the Plumbing Trade of London, to be held at the Guildhall, to confer as to the Registration of Plumbers, &c. 3 p.m.

Surveyors' Institution.—Discussion on Mr. Edward Smyth's paper on "The Copyhold Enfranchisement Bill, 1884-85." 8 p.m.

London Institution.—Mr. Frederic Harrison on "Paris as a Historical City." 5 p.m.

Society of Arts (Cantor Lectures).—Professor H. S. Hele Shaw on "The Friction of Fluids." 8 p.m.

Inventors' Institute.—Mr. William Johnson on "Brick-making Machinery, Bricks, and their Manufacture." 8 p.m.

Leeds and Yorkshire Architectural Society.—Mr. C. Pebody on "The Architecture of the Thirteenth and Nineteenth Centuries."

Dundee Institute of Architecture.—Mr. W. Stephenson on "Egypt and its Monuments." 7 p.m.

TUESDAY, JANUARY 26.

National Association of Master Builders.—Half-yearly meeting, to be held in Derby at 2·30 p.m.

Royal Institution.—Mr. Reginald Stuart Poole on "Naucratis." 3 p.m.

Institution of Civil Engineers.—Mr. C. E. Stromeyer on "The Injurious Effect of a Blue Heat on Steel and Iron." 8 p.m.

Architectural Association.—Meeting of members interested *re* Italian Excursion. Discussion on Florence. 6·30 p.m.

WEDNESDAY, JANUARY 27.

Society of Arts.—Mr. Henry Davey on "Machinery in Mines." 8 p.m.

Civil and Mechanical Engineers' Society.—Mr. R. Harkness Twigg on "The Safety of Life and Property at Sea." 7 p.m.

Liverpool Engineering Society.—Mr. G. L. Burton, Assoc.-M.Inst.C.E., on "Modern Milling, with special reference to the Carter Process." 8 p.m.

THURSDAY, JANUARY 28.

Royal Academy of Arts.—Lectures on Sculpture: Mr. A. S. Murray on "The Early History of Bas-Relief." 8 p.m.

Society of Antiquaries.—The Rev. F. J. Heales on "Roman Remains from Willoughby, Lincolnshire." 8·30 p.m.

Society of Telegraph-Engineers and Electricians.—The President, Prof. D. E. Hughes, F.R.S., will deliver his "Inaugural Address." 8 p.m.

London Institution.—Professor John Perry on "Telpherage." 7 p.m.

FRIDAY, JANUARY 29.

Architectural Association.—Mr. A. Beresford Pite on "Cathedral Façades." 7 30 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. Llewelyn B. Atkinson on "Electrical Measuring-Instruments." 7·30 p.m.

Miscellanea.

The Registration of Plumbers. — The Worshipful Company of Plumbers, being desirous to take steps for giving effect to the recommendations of the General Council who have been considering the best means of securing the greater efficiency of plumbing and draining work in dwelling-houses, have, as will be seen by an advertisement in this week's *Builder*, convened a meeting of the London plumbing trade, to be held at Guildhall on Monday next, to consider the question of registration, &c. The recommendations of the Council will be found in the *Builder* for August 8, 1885, p. 185.

Accident to a Church Tower.—Extensive restorations have been going on at the parish church, All Saints, Kingston-on-Thames, since August last, under the direction of Mr. Pearson. On the 2nd inst. an alarming accident occurred. It had been intended to raise the north and south arches of the tower, as the east and west one had previously been raised; an arch for the south side was built in before Christmas, and immediately after Christmas the workmen proceeded to take down the walling between the new and the old arch. No sooner, however, was this done than a crack appeared in the south-east pier of the tower, which showed an unsuspected weakness in that part. The tower was shored up for Sunday, and the next day Mr. Pearson came down and pronounced that the idea of raising these two arches must be abandoned. He gave directions as to the shoring-up of the tower on that side while the damage to the pier was being repaired. This is now being carried out, and Mr. Pearson has confidence that the pier will ultimately be made very much stronger than ever it has been before.

A New Pulpit of Caen Stone, embellished with three carved figures of Our Lord, St. Peter, and St. Mary Magdalene (the latter being the patron saint of the Church), was presented to the Parish Church of Lillington, near Leamington, at Christmas. The work was executed by Messrs. Jones & Willis.

Liverpool Engineering Society. — The first ordinary meeting of the twelfth session was held at the Royal Institution, Colquitt-street, Liverpool, on Wednesday, January 13th, Mr. Coard S. Pain (President) in the chair. A paper was read by Mr. Arthur J. Maginnis, M.Inst.N.A., entitled, "A Strange Failure of Steel Boilers." Since the introduction of steel for marine boilers, much has been written and disclosed about the strange freaks of the material, but as far as can be traced no similar cases of failure to those described in the paper have been experienced. The peculiar nature of the failure consisted in the steel plates commencing, in two steamers (after a period of two and a half years' satisfactory working), to crack spontaneously some days after steam had been let down, without exhibiting any special reason for so doing; and as they continued to occur each time the vessel came into port, at one time in the combustion chamber plates, at another time in the furnaces, and so on, it became evident that some change was taking place in the material. Some extensive mechanical and chemical tests were made on strips from the cut-out portion of the plates (given in the appendix to the paper), but as they threw no light on the matter, and the cracks continued to occur, it became a matter for serious consideration whether the boilers, or at least the interiors, must not be condemned, and as no previous cases had occurred, considerable difficulty was experienced in coming to a decision as to what course to take. It was eventually decided to have new boilers altogether, and the wisdom of the step was soon afterwards confirmed, as it was found that the blows given when cutting off the rivets cracked and broke the shell, furnace-fronts, and other plates in a most unusual and alarming manner. As the failure of the material in these boilers reveals the unpleasant fact that it is possible for steel to be used which may afterwards become treacherous, notwithstanding the extensive tests and rigid inspections now made, it will be interesting to obtain some satisfactory reason for the unaccountable change which undoubtedly took place, but as mild steel is now generally conceded to have passed beyond the tentative state, the owners of these steamers decided to again have steel boilers, but of the Siemens-Martin manufacture instead of the Bessemer.

The Charterhouse.—At the meeting of the Metropolitan Board of Works on the 15th inst., the Parliamentary Committee presented a report recommending the Board not to petition against the Bill promoted by the Governors of the Charterhouse for the sale or other disposal of the Middlesex estate of the Charterhouse, but in consequence of a letter addressed to the Board by the Holborn District Board calling attention to the Bill, and asking the Board to take such steps as they may think proper to secure the land as an open space or recreation-ground for the use of the public, and forwarding a copy of the report of the Medical Officer of Health for the District on the subject, the matter was referred back to the Committee for further consideration. The Society for the Protection of Ancient Buildings have presented a memorial to the Governors, in which they suggest that the buildings should be utilised as a picture-gallery or some similar purpose, and that the grounds should be thrown open to the public as a place of recreation.

Lectures on Forestry at the City of London College.—Professor Boulger, F.L.S., is in progress of delivering a course of ten lectures at this College on "Forestry," with special reference to the examinations of the Surveyors' Institution. The course commenced on Jan. 13. It is intended to give practical demonstrations in the country during the spring. The syllabus embraces the consideration of climate and trees, land suitable for arboriculture, the drainage and other preparation of the land, nurseries and their management, planting operations, thinning and maintenance, felling and barking, timber measurement, exploitation and management of coppice, the distinctive characters of the various British timber trees, &c.

The Portland Cement Trade. — Messrs. Matheson & Grant's "Engineering Trades' Report" for January says that the Portland cement trade, the factories for which are mainly situated in the London district, is in a very depressed condition; both home and foreign orders are much below the average of the last two years, and some of the factories are working short time.

The Surveyors' Institution.—More than 100 candidates have, we are given to understand, sent in their names for this year's examinations. Of this number forty-five are candidates for the studentship of the Institution,—their examination taking place during the present week. The remaining fifty-seven candidates will shortly offer themselves for examination in professional knowledge with the view of qualifying for the Professional Associateship or Fellowship of the Institution. The number of the candidates would have been still larger this year but for the effects of the new rule requiring, as a condition of admission to the examinations, proofs of satisfactory performance of practical and responsible duties in a surveyor's office under the hands of their employers. The whole body of candidates is nearly equally divided between the three branches of land agency, valuing, and building surveying.

The Menzel Exhibition at Berlin.—One of the principal attractions in Berlin, during the past few weeks, has been the exhibition of the works of Herr Menzel, which are now on show in the *salons* of the Royal Academy of Fine Arts in that capital. The fête commemorative of the seventieth birthday of the artist, in connexion with this exhibition, passed off in the most brilliant manner. The German Emperor sent his felicitations in an autograph letter. The Prince Imperial, the German Chancellor, and several other great dignitaries, as well as all the most eminent representatives of literature and art in Berlin, presented their congratulations in person to the artist, at his private residence. In the evening Herr Menzel dined with the Crown Prince. On the opening day the exhibition was visited by the Crown Prince and Crown Princess, Herr Gossler, the Minister of Education, and likewise representatives of the other Ministries. From Breslau a deputation of the Town Council waited upon Herr Menzel, to present him with the honorary citizenship of that town.

New Water Towers at the Wandsworth County Lunatic Asylum.—The fire which took place about twelve months since at the Surrey County Lunatic Asylum, near Wandsworth Common, has led to the erection of two water-towers, and the laying down of additional water-mains for use in case of future outbreaks of fire. The tower on the east side of the asylum buildings occupies a site about 20 ft. above the ground-level of the several ward blocks, is 22 ft. square at the base, and is 60 ft. in height to the point where it is surmounted by the tank. The tank has a capacity of 22,000 gallons. The tower is faced with stock and red brick, with string-courses and quoins at the angles in blue Staffordshire brick. The tank was designed by Mr. Mackonochie, C.E., of the Surrey Commercial Docks, and manufactured by Messrs. Stothart & Pritt, engineers, Bath. The tower on the west side of the buildings is also 22 ft. square, but of less altitude than that on the east side, being 40 ft. in height to the platform level, the extreme height, including the tank, which will hold 10,000 gallons of water, being 52 ft. This tank was constructed by Messrs. Shand & Mason. The water to supply the two tanks will be pumped up from three wells within the ground by engines of 20-h.p. As an additional safeguard in case of fire, seventy-nine hydrants have been laid down, forty-one of these being in the asylum buildings. The whole of the hydrants were supplied by Messrs. Shand & Mason. Two external staircases have also been erected at the main asylum buildings. A new block of buildings has also been erected for the accommodation of an increased number of inmates. Mr. F. Iles, architect to the asylum committee of magistrates, designed the towers and other works, which have been carried out by workmen in the employ of the county authorities, under Mr. Iles's superintendence.

The Inventions Exhibition.—*Invention* asks:—"Can the statement now put forward in a contemporary be true, that the Inventions Exhibition, though it was not expected to draw so much money as its predecessors, has resulted in a loss so large that the surplus from former exhibitions has been nearly absorbed? The receipts must, after all, have been magnificent, and it is strange news that the last South Kensington show has left so heavy a loss. It would be as well if the accounts were promptly published, and in a more detailed form than those of previous exhibitions."

Sanitary Assurance Association.—Prof. T. Roger Smith, F.R.I.B.A., lectured on "A Damp House" at the Parkes Museum last evening (Wednesday), when there was a large attendance, and Sir Joseph Fayrer, K.C.S.I., President of the Association, presided. Prof. Roger Smith, in his lecture, said that damp was the enemy of the English climate, and pointed to the importance of taking every precaution to keep damp out of our houses. Damp from the soil should be kept back by means of asphalte and other impervious materials in the walls, and, indeed, over the whole area within the walls of the house. He advocated hollow walls, and particularly urged the great importance of using the best materials in house building. In addition to dampness from without there were sources of dampness from within. Tanks of water under floors were objectionable, and a fruitful source of dampness of the worst kind was defective drains. The combustion of gas in any large quantity charged the air with moisture. He recommended any one who had a damp house to leave it, but if that was impossible, then the house should be thoroughly examined, and defects made good in the most thorough way. Any half measures were a mistake. To all he said, "Shun a damp house; he runs a great risk who lives in it. He does a good work who turns a damp house into a dry one." A most interesting discussion followed, in which Mr. H. Rutherfurd, barrister-at-law; Mr. E. C. Robins, F.R.I.B.A.; Mr. T. M. Rickman, F.R.I.B.A.; Mr. Thos. Blashill, F.R.I.B.A.; and the Chairman took part, the Chairman remarking that damp was the most fruitful source of disease in India. The meeting terminated at a late hour with votes of thanks to Professor Roger Smith and Sir Joseph Fayrer.

The Aeri Filter.—Under this title a filter, patented by Mr. J. Mallie, is being introduced in England by the House Sanitation Company. It is claimed that the Aeri filter not only clarifies the water, but also retains the germs, animalculæ or organisms held in suspension therein, whereby the water after passing through the filtering medium will be rendered physiologically pure without being deprived of the salts and air necessary for its digestion. The water in this filter is also in contact with a cushion of air under pressure which becomes absorbed by and highly aërates the water, and renders it very digestible. The filter is very readily connected to water-supply pipes leading from cisterns. It is easily taken to pieces and refitted, and readily cleaned by plunging into boiling water, and brushing, so as to destroy and remove all dangerous germs or microbes arrested therein, the frequency of cleaning depending on the quantity of water used, and the degree of impurity (usually about two months). The filtering medium is inclosed in a protective transparent, thick glass casing, and is also provided with a safety-valve arranged to shut off the supply in the event of the filter becoming broken, whereby all danger of flooding is avoided, as well as the admixture of unfiltered water. The filtering action operates in an outward direction through the walls of the filter, and the liquid supplied by the pipe from a cistern containing water under pressure (at least 10 ft. above the level of the filter), percolates through the porous surface to the outside.

Earthenware Cisterns. — Messrs. Jas. Duckett & Son, of Burnley, inform us that they have succeeded, by a new process which they have patented, in producing earthenware cisterns of a much larger size than have hitherto been made. They have just made, and successfully burned, a cistern of the size of 7 ft. 8 in. by 3 ft. 7 in. by 3 ft. 6 in. The great difficulty in the way of large cisterns of this material is to prevent the clay warping and cracking during the burning; and this difficulty the patentees state that they have been able to get over by the process they employ. If so, the improvement is an important one.

Messrs. Doulton & Co.'s New Buildings. With reference to a paragraph in our last (p. 146), referring to certain tenders for reinstating some premises which had been destroyed by fire, Messrs. Doulton & Co. write to say that the report which they received from their architects, Messrs. Waring & Nicholson, was that the firm whose tender was the lowest had made an error in calculation, and required an increased price. Under these circumstances, and with the advice of their architects, Messrs. Doulton felt they were at liberty to take any course they might deem advisable.

Science and Art Department.—We have received from Colonel Donnelly the Calendar and General Directory of the Science and Art Department for the year 1886, published by Eyre & Spottiswoode, from which, at the cost of 1s., a complete statistical statement is to be obtained of the working of this now immense ramification of official artistic instruction all over the kingdom.

Royal Meteorological Society. — The annual general meeting of this Society was held on Wednesday evening at the Institution of Civil Engineers, Mr. R. H. Scott, F.R.S., President, in the chair. The secretary read the report of the council, which stated that the past year had been one of great activity, as the eight committees which had been appointed had met frequently and had done much for the advancement of meteorology. The number of Fellows on the roll of the Society is 537. The President (Mr. R. H. Scott) then gave his retiring address. The officers and council for the ensuing year were then elected, Mr. William Ellis, F.R.A.S., being the new President.

The Mersey Tunnel Railway was formally opened for passenger traffic on Wednesday last by H.R.H. the Prince of Wales. In the *Builder* for February 26 last year we gave views of the stations at James-street, Liverpool, and at Birkenhead, both of the buildings having been carried out from the designs of Mr. G. E. Grayson, architect. We will give some further particulars about the new tunnel and railway next week.

Railway Coupling Trials.—The trial of safety couplings promoted by the Amalgamated Society of Railway Servants will (through the kindness of Mr. C. Scotter, General Manager of the London and South-Western Railway) take place at the Nine Elms Goods Yard, London, S.W., on a date yet to be fixed. As the number of wagons placed at the Society's disposal is limited, it is obvious that a selection must be made by the committee entrusted with the arrangements; and in order that this may be done, the Society asks inventors desirous of competing to forward to the office of the Society, not later than January 30th, drawings, specifications, or models of the couplings they desire to have tested. Preference will be given to such as retain the kind of draw-bar hook at present in use.

Paving Apportionments.—At the Worship-street Police-court on Wednesday last, Mr. Hannay gave judgment in a number of summonses taken out by the Hackney District Board of Works against owners of house property in Amherst-road, Hackney, for the recovery of rates made under an apportionment for paving works, in accordance with the Metropolis Local Management Act. A very large amount of money was claimed by the complainants, the expenses having been incurred under peculiar circumstances. In the year 1877 certain paving work was executed by the District Board of Works in the road named, and the cost, about 1,000*l.*, was charged on the rates. In consequence of recent decisions of the High Court, the metropolitan vestries had found that they had been wrong in so charging the costs on the general rates, and these proceedings were taken to recover the rates. Mr. Hannay's decision was to the effect that the road in question was a "new street" in the meaning of the Act, and that he was unable to go behind the resolution of the Board that it was a new street, and required paving, the Board themselves being fully responsible for such resolution. He considered the orders asked for should in justice be made, and he accordingly made the orders for payment. He granted a case for the consideration of a superior Court.

PRICES CURRENT OF MATERIALS.

TIMBER	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	12 10 0	15 10 0
Sequoia, U.S. ....ft. cube	0 2 6	0 2 9
Ash, Canada ....load	3 0 0	5 0 0
Birch ,, ...load	3 0 0	4 10 0
Elm ,, ...load	3 10 0	5 0 0
Fir, Dantsic, &c. ....load	1 10 0	4 10 0
Oak ,, ...load	3 0 0	5 0 0
Canada ....load	6 0 0	7 0 0
Pine, Canada red ....load	3 0 0	4 0 0
,, yellow ....load	3 15 0	5 5 0
Lath, Dantsic ....fathom	4 10 0	6 0 0
St. Petersburg ....fathom	5 0 0	7 0 0
Wainscot, Riga....log	2 15 0	4 10 0
,, Odessa, crown ....log	3 12 6	3 15 0
Deals, Finland, 2nd and 1st...std. 100	7 10 0	8 10 0
,, 4th and 3rd ....std. 100	6 0 0	7 10 0

TIMBER (*continued*).	£. s. d.	£. s. d.
Riga ....load	6 0 0	8 0 0
St. Petersburg, 1st yel. ....load	9 0 0	15 0 0
,, 2nd ,, ...load	7 0 0	8 15 0
,, white ....load	8 0 0	10 10 0
Swedish....load	6 0 0	15 10 0
White Sea ....load	8 0 0	18 0 0
Canada, Pine 1st ....load	17 0 0	31 10 0
,, 2nd ....load	12 0 0	17 10 0
,, 3rd, &c. ....load	7 0 0	10 0 0
,, Spruce 1st ....load	9 0 0	13 0 0
,, 3rd and 2nd ....load	6 0 0	8 0 0
New Brunswick, &c....load	5 0 0	7 0 0
Battens, all kinds ....load	4 0 0	12 0 0
Flooring Boards, sq. 1 in.—Prepared, first ....sq.	0 9 0	0 13 0
Second ....sq.	0 7 6	0 8 6
Other qualities ....sq.	0 5 0	0 7 0
Cedar, Cuba....foot	0 0 3½	0 0 4
Honduras, &c. ....foot	0 0 3	0 0 4
Australian ....foot	0 0 3	0 0 3½
Mahogany, Cuba ....foot	0 0 5	0 0 7½
St. Domingo cargo av. ....foot	0 0 5½	0 0 7½
Mexican ,, ...foot	0 0 4	0 0 5
Tobasco cargo av. ....foot	0 0 4	0 0 6½
Honduras cargo av. ....foot	0 0 4½	0 0 6½
Maple, Bird'seye ....foot	0 0 3½	0 0 6
Rose, Rio ....ton	7 0 0	16 0 0
Bahia....ton	6 0 0	14 0 0
Box, Turkey ....ton	5 0 0	18 0 0
Satin, St. Domingo ....ft.	0 0 0	0 0 0
Porto Rico ....ft.	0 0 0	0 0 0
Walnut, Italian ....ft.	0 0 4	0 0 5

METALS.		
Iron—Pig in Scotland ....ton	2 2 6	0 0 0
Bar, Welsh, in London....ton	4 15 0	5 0 0
,, ,, in Wales ....ton	4 7 6	4 10 0
,, Staffordshire, London ....ton	5 15 0	7 0 0
Sheets, single, in London....ton	7 10 0	9 0 0
Hoops ,, ...ton	6 5 0	7 5 0
Nail-rods ,, ...ton	5 15 0	7 0 0

METALS (*continued*).	£. s. d.	£. s. d.
Copper—		
British, cke. and ingt. ....ton	43 0 0	44 0 0
Best selected ....ton	45 0 0	46 0 0
Sheets, strong....ton	52 0 0	0 0 0
,, India ....ton	48 0 0	48 10 0
Australian, fine cash....ton	0 0 0	0 0 0
Chili, bars ,, ...ton	40 2 6	40 10 0
Yellow Metal....lb.	0 0 4½	0 0 4½
Lead—Pig, Spanish ....ton	12 10 0	0 0 0
English, com. brands ....ton	12 17 6	13 0 0
Sheet, English ....ton	13 15 0	14 0 0
Spelter—		
Silesian, special ....ton	15 2 6	15 5 0
Ordinary brands ....ton	14 17 6	15 0 0
Tin—		
Banca ....ton	96 0 0	0 0 0
Billiton ....ton	94 0 0	0 0 0
Straits ....ton	92 5 0	92 15 0
Australian ....ton	92 5 0	92 15 0
English ingots....cwt.	97 0 0	0 0 0
Zinc—		
English sheet ....cwt.	0 0 0	0 0 0

OILS.		
Linseed ....ton	18 15 0	19 2 6
Cocoanut, Cochin ....ton	29 10 0	30 0 0
Ceylon ....ton	26 0 0	0 0 0
Copra....ton	14 0 0	15 15 0
Palm, Lagos ....ton	29 10 0	0 0 0
Palm-nut Kernel ....ton	25 0 0	0 0 0
Rapeseed, English pale....ton	22 10 0	0 0 0
,, brown ....ton	21 0 0	0 0 0
Cottonseed, refined ....ton	17 10 0	19 0 0
Tallow and Oleine ....ton	25 0 0	40 0 0
Lubricating, U.S. ....gal.	7 0 0	10 0 0
,, Refined ....gal.	4 0 0	12 0 0
Turpentine—		
American, in cks. ....cwt.	1 6 6	1 6 9
Tar—Stockholm ....brl.	0 19 0	0 19 6
Archangel....brl.	0 12 0	0 12 6

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New Wing to Hospital, Shadwell	East London Hospital	Not stated	March 31st	i.
New Infirmary	Parish of Birmingham	do.	Not stated	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Construction of Tunnel	Leeds Cor. Waterworks	Filliter & Rofe	Jan. 26th	ii.
Repairing, &c., Street Lamps	Tottenham Local Board	— De Pape	do.	xviii.
Kerbing, Tar-paving, &c., Work	Lewisham Brd. of Wks.	*Official*	do.	ii.
Articles and Works	Chelsea Vestry	G. R. Strachan	Jan. 28th	ii.
Australian Blue Stone or Guernsey Granite	Dartford Union	*Official*	Jan. 29th	ii.
Sewerage Works	Bexhill Local Board	H. B. Nichols	Feb. 1st	ii.
Construction and Extension of Reservoirs	Stockton, &c., Water Bd.	J. Mansergh	Feb. 2nd	ii.
Boundary-Walls, Abutments, &c., for Bridge	Colne and Marsden L. B.	H. Bancroft	do.	ii.
Ironwork for Bridge	do.	do.	do.	ii.
Making-up Roads	Wandsworth Bd. of Wks.	*Official*	do.	ii.
Collection and Removal of Dust	do.	do.	do.	ii.
Iron Fence and Gates, and Erection of same	Lydd Town Council	Burrell & Valpy	do.	ii.
Casting and Putting-up Service Tanks	Hastings R. S. A.	Jeffery & Skiller	Feb. 3rd	xviii.
New Post-Office, Carnforth	Com. of H.M. Works	*Official*	Feb. 5th	ii.
Ironwork for Bridges	Midland Railway Co.	A. A. Langley	do	xviii.
Sewage Disposal Works	Burton-on-Trent Cor.	Jas. Mansergh	Feb. 6th	ii.
Road Materials	Com. of H.M. Works	*Official*	Feb. 9th	ii.
Alterations to Baths, &c.	Com. of Poplar Public Baths and Washhouses	Messrs. Clarkson	Feb. 10th	xviii.
Mortuary Chambers, Post-Mortem Room, &c.	Hornsey Local Board	T. De Courcy Meade	Feb. 15th	xviii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor	Ulverston Local Board	200*l.*	Jan. 25th	xvi.
Borough Surveyor	Dewsbury Town Council	250*l.*	Feb. 5th	xvi.

TENDERS.

CLAPHAM (Surrey).—For 3,150 ft. of roads, 2,500 ft. of pipe sewer, and 650 ft. of brick sewer, on the "Clock House" Estate, Clapham-common, S.W. Messrs. Wheeler & Hollands, surveyors:—

T. Rigby, Croydon	£4,990 0 0
G. Jervis Smith, Streatham	4,080 0 0
G. Neal, Wandsworth-common	3,487 0 0
W. Harris, Camberwell	3,398 0 0
C. Killingback, Camden Town	3,351 0 0
T. Blackmore, Clapham	3,003 0 0

EAST GREENWICH. — For new shop-fronts and alterations to 1, Alma-place, East Greenwich, for Mr. T. H. Parry. Mr. W. T. Hunt, jun., architect:—

Leng	£181 0 0
Lewis	165 13 6
Thomas	160 0 0
Scholfield (accepted)	154 0 0

FINCHLEY.—For re-building class-rooms at the Anglo-French College, Finchley. Mr. Banister Fletcher, architect:

Bowen	£1,327 0 0 !
Battam & Son	541 0 0
Nightingale	533 0 0
Evans	460 0 0
Castle	449 0 0
Aldridge & Co.	428 0 0
Seed	398 0 0
Lyford	386 0 0
Wright	378 0 0
J. O. Richardson	349 0 0
Neave	348 0 0 !

HORNSEY.—For the erection of play-room and repairs at the Workhouse School, Hornsey-road, for the parish of St. Mary, Islington. Mr. William Smith, A.R.I.B.A., architect. Quantities by Mr. T. Marcus Houghton, Imperial-buildings, Ludgate-circus:—

Eade & Son	£737 0 0
Dunford & Langham	717 0 0
Bayliss	669 0 0
Riches	660 0 0
Barber	635 0 0
Palmer	620 0 0
Seed Bros.	620 0 0
Reason	618 0 0
Dearing & Son	616 10 0
Mattock Bros.	616 0 0
Larke & Son	610 0 0
Robson	610 0 0
Collins	602 0 0
Killingback	600 0 0
Hirst	595 0 0
Martin	584 10 0
Webb	575 0 0
Whicker	569 0 0
Hack	566 0 0
Hewitt	558 0 0
Norris	549 0 0
Neave & Neave	544 0 0
Dixon	531 0 0
Pack Bros.	531 0 0
Ward & Lamble	513 0 0
Watkins & Coyle	486 10 0

LEICESTER.—For the erection of two shops and dwelling-house, at the angle of Granby and Chatham streets, Leicester, for the Leicester Co-operative Society, Limited. Mr. Thomas Hind, architect, Leicester:—

J. A. Bent	£1,650	0	0
A. Plant	1,632	0	0
G. Hewitt	1,624	0	0
Sharpe & Son	1,615	0	0
Clarke & Garrett	1,598	0	0
E. Kellett & Son	1,578	0	0
F. Major	1,570	0	0
T. Tyers	1,530	0	0
E. Lawrence (accepted)	1,515	0	0

LEICESTER.—For providing and fixing wrought-iron hurdle fencing in Lancaster-street and Regent-street, for the Corporation of Leicester. Quantities by Mr. J. Gordon, C.E., Borough Surveyor:—

C. Mason & Co., Leicester	£631	17	6
Baldwin & Amies, Ashbourne	472	15	0
G. B. Smith, Glasgow	402	7	6
J. O. & C. E. Brettell, Worcester	397	8	9
Hill & Smith, Brierly Hill	389	11	8
Hydes & Wigfull, Sheffield	368	18	9
W. T. Burbidge, Leicester	363	10	0
W. W. Judd & Co., Leicester	346	11	3
Iron, Wire, Wire-rope, and Fencing Company, London	343	1	3
W. Hayward & Co., Wolverhampton	338	15	0
R. C. & J. Kesy, Birmingham	327	5	0
Wright Bros., Leicester	324	5	0
Brookes & Co., Wolverhampton *	288	0	0
Johnson Bros. & Co., London (incomplete)	281	0	0

* Accepted.

LONDON.—For building new residence, 35, Hans-place, S.W., for Mr. Guy Sebright. Mr. G. S. Finlay, architect. Quantities supplied by Messrs. Drower & Ruault:—

		Extra for Dado.	
Bush	£3,493	£69	£3,562
Higgs & Hill	3,494	64	3,558
J. Garlick *	3,480	65	3,545

* Accepted.

LONDON.—For adapting certain premises in Millman-street, Chelsea, to accommodate upwards of 100 horses, for the London Road Car Company. Mr. H. I. Newton, architect, Queen Anne's-gate, S.W.:—

Walker, Limehouse	£759	0	0
Lorden & Sons, Upper Tooting	659	15	0
Porter, Southwark	647	0	0
Chafen, Rotherhithe (accepted)	599	0	0

LONDON.—For alterations and new shop-front to 13, Oxford-street, for Mr. Raphael:—

Charles Jeffreys (accepted)	£292	3	0

ROTHERHITHE.—For curbing, paving, and making up Eugenia and Alpine roads, for the Rotherhithe Vestry. Mr. Edward Thomas, surveyor:—

Bevers	£847	0	6
Hobman	829	0	0
Etheridge	770	0	0
Adams	760	0	0
Woodham & Fry	712	0	0
Mowlem	697	0	0
Treherne & Co. (accepted)	690	0	0

[Surveyor's estimate, £799 1 4]

ROTHERHITHE.—For certain alterations at Albion House, Rotherhithe, for Mr. William Houghton. Mr. Edward Thomas, architect:—

White	£190	0	0
Chafen (accepted)	187	0	0
Janes	185	0	0
Evans	183	0	0

[Architect's estimate, 175*l.*]

TILBURY.—For workshops, stores, &c., for the Tilbury Docks Engineering and Ship Repairing Company. Mr. Edward Clark, architect. Quantities by the architect:—

Perry & Co. (accepted)	£10,253	0	0

WALTON (Suffolk).—For building four cottages, for Mr. Charles Rattle, at Walton, Suffolk. Messrs. R. T. Orr & Son, architects. No quantities:—

C. S. A. Woolnough, Felixstowe	£649	0	0
C. A. Wyatt, Ipswich	598	10	0
T. Ward, Felixstowe	589	0	0
A. Coe, Ipswich	584	0	0
W. Calver, Walton	560	0	0
Finch & Parker, Walton	540	0	0
T. Warman, Felixstowe	539	0	0
C. Canham, Walton	487	0	0
S. Markham, Ipswich	470	0	0
J. D. Horne, Walton	460	0	0
Fox & Wallis, Walton	439	0	0

[Architects' estimate, 440*l.*]

WORTHING.—For additions to Worthing Police Station. Quantities by Mr. Nunn, Brighton. Mr. Ellice-Clark, M Inst. C.E., County Surveyor:—

J. Reynolds, jun., West Brighton	£1,450	0	0
J. Blaker, Worthing	1,443	0	0
J. Morris, East Grinstead	1,415	0	0
J. Parsons & Sons, Hove	1,400	0	0
P. Peters, Horsham	1,395	0	0
R. Cook, Ifield, Crawley	1,389	9	5
J. Longley, Crawley	1,380	0	0
Woolgar & Son, Horsham	1,375	0	0
C. Rowland, Horsham	1,370	0	0
C. C. Cook, Worthing	1,368	0	0
E. Snewin & Son, Worthing	1,353	0	0
W. Jarrett, Angmering	1,340	0	0
W. Twine, Worthing	1,209	16	5
W. W. Smith, Worthing	1,165	10	0
A. J. Wright, Worthing	1,150	0	0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.

TO CORRESPONDENTS.

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THE INDEX and TITLE-PAGE for Volume XLIX. (July to December, 1885) was given as a Supplement with our issue of January 9th.

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